

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE**

**VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)**

**Accredited by NAAC with "A" Grade**

**2022-2023**



**DEPARTMENT OF BOTANY**

**MINUTES OF BOARD OF STUDIES**

**EVEN SEMESTER**

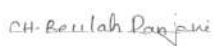





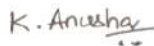
**31-03-2022**

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE  
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC recredited at 'A' level  
Autonomous –ISO 9001-2015 Certified  
**DEPARTMENT OF BOTANY**  
**BOARD OF STUDIES MEETING: 31<sup>st</sup> March 2022**

The Board of studies meeting of Department of Botany was convened at 3:00 pm on 31 /03/2023 under The chairmanship of Smt.Ch. Beulah Ranjani Head of the Department .The members present have discussed various aspects such as changes to be made in the syllabi, scheme of Evaluation and Blue print both for theory and practical papers, Departmental activities for 2022-2023, Estimated Budget proposals 2022 -2023 for implementing them effectively during the II, IV, & VI semester for the academic year 2022-2023 onwards.

**The following members were present.**

S.No	Name	Designation	signature
1.	<b>Smt. Ch. Beulah Ranjani</b> Head, Department of Botany A.G&S.G.S Degree College Vuyyuru.	Chair person	
2	<b>prof. Avasan Maruthi</b> Bio Sciences & Bio technology Krishna University Machilipatnam.	University Nominee	
3.	<b>Sri Dr. Ch. Srinivasa Reddy</b> Lecturer in Botany SRR & CVR Govt. Degree College, Vijayawada.	Subject Expert	
4.	<b>P. Srinivasa Rao</b> Department of Botany, P.B. Siddhartha College,	Subject Expert	
5.	<b>Sri. S. Krishna Suman,</b> Natural farmer, yakamuru Vuyyuru.	Industrialist	
6.	<b>Sri. N. Ramana Rao</b> Lecturer in Botany, A.G &S.G.S Degree College Vuyyuru.	Member	
	<b>Miss. K. Anusha</b> Lecturer in chaitnya college, Gudiwada.	Student Represent	

### **Agenda for B.O.S Meeting.**

1. To recommend the syllabi (Theory & Practical), Model question paper for II Semester of I B.Sc (B.Z.C,Aqua) for the academic year 2022 - 2023.
2. To recommend the syllabi (Theory & Practical), Model question paper for IV Semester of II B.Sc (B.Z.C, Aqua) for the academic year 2022 - 2023.
3. To introduce Skill Enhancement Course the syllabi (Theory & Practical), Model question paper for V Semester of III B.Sc (Aqua) for the academic year 2022 - 2023.
4. To recommend the Blue print for the semester end exam for II, IV & VI semester of I,II, III B.Sc (B.Z.C, Aqua) for the academic year 2022 - 2023.
5. To recommend the teaching and evolution methods to be followed under Autonomous status.
6. Any other matter.

## **RESOLUTIONS**

1. It is resolved to continue the same syllabi (Theory & Practical), model question paper & guide lines to be followed by the question paper setters of Botany of II semester of I B.Sc. (B.Z.C, Aqua) under Choice Based Credit System (CBCS) approved by the Academic Council of 2022 – 2023
2. It is resolved to implement the syllabi (Theory & Practical), model question paper & guide lines to be followed by the question papers under Choice Based Credit System (CBCS) setters of Botany of IV Semester of II B.Sc. (B.Z.C, Aqua) approved by the Academic Council of 2022 –2023.
3. It is resolved to implement the same syllabi & model papers under Choice Based Credit System (CBCS) Setters of Botany of V semester SEC 6C (Plant tissue culture) and SEC 7C (Mushroom cultivation ) of III B.Sc. (B.Z.C, Aqua) approved by the Academic Council of 2022-2023.
4. It is resolved to Continue the same Blue prints of I, IV, & VI Semesters of B.Sc Botany for the Academic year 2022-2023.
5. It is resolved to continue the following teaching & evolution methods for the Academic year 2022-23.
6. Any other matter.

### **Teaching methods:**

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

### **Evaluation of a student is done by the following procedure:**

### **Internal Assessment Examination:**

1. Out of maximum 100 marks in each paper for I, III B.Sc, 30 marks shall be allocated for internal assessment.
2. Out of these 30 marks, 20 marks are allocated for announced tests (i.e . IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for I, III B.Sc.
3. Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment.
4. Out of these 25 marks, 15 marks are allocated for announced tests (i.e . IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated on the basis of candidate's percentage of attendance / assignment for II semester.
5. There is no pass minimum for internal assessment for I, II, III B.Sc.



• Semester – End Examination:

1. The maximum mark for II (BZC) semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- 2 The maximum mark for I, III B.Sc semester- End examination shall be 70 marks and duration of the examination shall be 3 hours. Even through the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS”
3. Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, III, & V semester for I, II & III B.Sc.
4. Discussed and recommended for organizing Seminars, Guest lectures, Work – Shops to upgrade the Knowledge of students, for the approval of the Academic Council.

*CH. Beulah Ranjani*  
**Chairman**

## Course Structure of BZC, AQUA Syllabus

Year	Semester	Paper code	Title of the paper	Marks(100)		Credits
				Internal assessment	End semester	
I	II	BOT2IA	Basics of of vascular plants and Phyto geography	30	70	3
			Practical-I	10	40	2
II	IV	BOTT41A	Plant physiology and Metabolism	25	75	3
			Practical-III	25	25	2
	IV	BOTT42A	Cell biology ,Genetics and plant Breeding	30	70	3
			Practical-III	25	25	2
II	VI	BOT-501	Plant tissue culture.	30	70	3
			Practical-v – 501	25	25	2
II	VI	BOT-502	Mushroom Cultivation	30	70	3
			Practical-v- 502	25	25	2

**Title of the Paper: Basics of Vascular plants and Phytogeography**  
(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

**Semester : II**

Course Code	<b>BOTT21A</b>	Course Delivery Method	Class Room / Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours / Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2017-18	Year of Offering: 2021 - 22	Year of Revision: -	Percentage of Revision: -

**Course Pre requisites:** Knowledge of Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography studied in intermediate.

**Course Description:**

This course will provide one with a basic and comprehensive understanding of anatomical structure and functions. Enable the student with depth of topics and helps them to gain an appreciation in the embryology of Angiosperms. On the other hand, importance of understanding plant ecology and biodiversity provides an extensive knowledge to the student.

**Course Objectives:**

1. The study of Pteridophytes
2. The study of Gymnosperms
3. Knowledge of Basic aspects of Taxonomy
4. Study of Systematic Taxonomy
5. Knowledge of Phytogeography

**Course Outcomes:** At the end of this course, students should be able to:

**CO1:** Gain knowledge in the classification and comparison of Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycle.

**CO2:** Justify evolutionary trends in Tracheo phytes to adapt for land habitat. Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their good and services for human welfare

**CO3:** Explanation of the process of fossilization and compare the characteristics of extinct and extant plants.

**CO4:** Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.

**CO5:** Locate different Phytogeographical regions of the world and India and can analyze their floristic wealth.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<b>Pteridophytes</b> General characteristics of Pteridophyta; classification of Smith (1955) upto divisions. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) <i>Lycopodium</i> (Lycopsida) and (b) <i>Marsilea</i> (Filicopsida). Stellar evolution in Pteridophytes Heterospory and seed habit.	12
II	<b>Gymnosperms</b> General characteristics of Gymnosperms; Sporne classification upto classes. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) <i>Cycas</i> ( <i>Cycadopsida</i> ) and (b) <i>Gnetum</i> (Gnetopsida). Outlines of geological time scale. A brief account on Cycadeoidea.	12
III	<b>Basic aspects of Taxonomy</b> Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family. Plant nomenclature: Binomial system, ICBN–rules for nomenclature. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria. Bentham and Hooker system of classification Systematic description and economic importance of the following families : (a) Annonaceae (b) Curcubitaceae.	12
IV	<b>Systematic Taxonomy</b> Systematic description and economic importance of the following families: (a) Asteraceae (b) Ascleceae (c) Amaranthaceae, (d) Euphorbiaceae (e) Orchidaceae, (f) Arecaceae (i) Poaceae Outlines of Angiosperm Phylogeny Group (APG IV).	12
V	<b>Phytogeography</b> Principles of Phytogeography, Distribution (wides, endemic, discontinuous species) Endemism – types and causes. Phytogeographic regions of World. Phytogeographic regions of India. Vegetation types in Andhra Pradesh.	12



**Botany Textbook:**

- (Vrukshasastram-I): Telugu Akademi, Hyderabad
2. Botany – II (Vrukshasastram-II): Telugu Akademi, Hyderabad
3. Acharya, B.C., (2019) Archchegoniates, Kalyani Publishers, New Delhi
4. Bhattacharya, K., G. Hait & Ghosh, A. K., (2011) A Text Book of Botany, Volume II, New Central Book Agency Pvt. Ltd., Kolkata
5. Hait, G., K. Bhattacharya & A.K. Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata
6. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi Pandey, B.P. (2013) College Botany, Volume-II, S. Chand Publishing, New Delhi

**Recommended Reference book:**

1. Smith, G.M. (1971) Cryptogamic Botany Vol. II., Tata McGraw Hill, New Delhi
  2. Sharma, O.P. (2012) Pteridophyta. Tata McGraw-Hill, New Delhi
  3. Kramer, K.U. & P. S. Green (1990) The Families and Genera of Vascular Plants, Volume –I: Pteridophytes and Gymnosperms (Ed. K. Kubitzki) .Springer-Verlag, New York
  4. Bhatnagar, S.P. & Alok Moitra (1996) Gymnosperms. New Age International, New Delhi Govil, C.M. (2007) Gymnosperms : Extinct and Extant. KRISHNA Prakashan Media (P) Ltd. Meerut & Delhi
  5. Sporne, K.R. (1971) The Morphology of Gymnosperms. Hutchinsons Co. Ltd., London
  6. Arnold, C.A., (1947) An introduction to Paleobotany McGraw –Hill Book Company, INC, New York
  7. Stewart, W.N., and G.W. Rothwell (2005) Paleobotany and the evolution of plants Cambridge University Press, New York Cambridge. London.
  8. Sambamurthy, A.V.S.S. (2005) Taxonomy of Angiosperms I. K. International Pvt. Ltd., New Delhi
  9. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi.
  10. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.
  - Cain, S.A. (1944) Foundations of Plant Geography Harper & Brothers, N.Y.
  10. Mani, M.S (1974) Ecology & Biogeography of India Dr. W. Junk Publishers, The Hague
- Course Delivery method:** Face-to-face / Blended

**Course has focus on:** Foundation

**Websites of Interest:**

<https://www.youtube.com/watch?v=VA2LNWkZNWo>  
<https://www.youtube.com/watch?v=zDUCacewuAg>  
<https://www.youtube.com/watch?v=sfFDOSM-EuA>  
<https://www.youtube.com/watch?v=wKNox2weqW4>

**Co-curricular Activities:****A. Measurable:**

1. Collection and identification of Pteridophytes from their native locality/ making an album by collecting photographs of Pteridophytes.
2. Collection and identification of Gymnosperms from their native locality/ making an album by collecting photographs of Gymnosperms.
3. Collection of information on famous herbaria in the world and preparation of a report.
4. Collection of information on famous botanic gardens in the world and preparation of a report.
5. Collection of data on plants of ethnic and ethnobotanical importance from Their native locality.
6. Preparation of a local flora by enlisting the plants of their native place.

**c. Assignments:** Written assignment at home / during '0' hour at college;

Lycopodium - life cycle, Marselia-life cycle, Cycas-life cycle, Gnetum-life cycle, Bentham & Hooker classification, Stellar evolution in Pteridophytes, characteristics of Cycadeoidea, Asteraceae-taxonomy, Asclepiadaceae-taxonomy, Euphorbiaceae-taxonomy, Cucurbitaceae-taxonomy, Principles of phytogeography, Endemism types & causes, Phytogeographic regions of India.

Preparation of charts with drawings, making models etc., on topics included in syllabus. Five kingdom classification, Miller & Urey experiment, Shape and Symmetry of viruses.

**B. General:**

1. Quiz

.....

**Answer all questions**

**Section-A**

**(20Marks)**

1. (a) What is meant by heterospory? Justify the advantage of heterospory over homosporous CO1, L1

OR

(b) Write about Protocorm and its morphological nature. CO1, L6.

2. (a) Explain the characteristics of Cycadeoidea. CO2, L2.

OR

(b) Enumerate Geological time scale. CO2, L1.

3. (a) Describe ICBN rules for nomenclature. CO3, L2.

OR

(b) Binomial nomenclature

4. (a) Write a note on Angiosperms Phylogeny Group. CO4, L6

OR

Ray floret and disc floret

5. (a) Discuss about the Vegetation types in Andhra Pradesh. CO5, L2.

OR

(b) Explain the causes and types of Endemism. CO5, L2.

**Section-B**

**Answer the following questions**

**5 x 10M = 50Marks**

1. (a) Describe diverse gametophytes present in the *Lycopodium* species. CO1, L2.  
(Or) Unit I

(b) What is sporocarp? Describe the structure of *Marselia* Sporocarp. CO1, L2.

2. (a) Describe the anatomy of *Cycas* leaflet. Add a note on xerophytic features of it. CO2, L2.

(Or) Unit II

(b) Describe the structure of *Gnetum* male and female cones. CO2, L2.

3. (a) What is Natural System of Classification, Bentham and Hooker System of Classification? CO3, L1.

(Or) Unit III

(b) Describe vegetative and floral characters of Cucurbitaceae. Add a note on and economic Importance CO3, L1.

4. (a) Elucidate floral characters of Asteraceae. CO4, L1.

(Or) Unit IV

(b) Describe floral characters of Poaceae. Add a note on economic importance CO4, L1.

5. (a) What is Phytogeography? Explain principles of Phytogeography. CO5, L2.

(Or) Unit V

(b) Explain about Phytogeographic region of India. CO5, L1.

Title of the Paper: **Basics of vascular plants and** Phytogeography  
(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

<b>SEMESTER - II</b>	<b>BOTT21A</b>	<b>2022-23</b>	<b>B.Sc, B.Z.C,A.B.C</b>
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Total Number of Lecture Hours: 30

**Course Prerequisites:** Knowledge of Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography studied in intermediate.

**Course Description:**

This course will provide one with a basic and comprehensive understanding of anatomical structure and functions. Enable the student with depth of topics and helps them to gain an appreciation in the embryology of Angiosperms. On the other hand, importance of understanding plant ecology and biodiversity provides an extensive knowledge to the student.

**Course Objectives**

1. The study of Pteridophytes
2. The study of Gymnosperms
3. Knowledge of Basic aspects of Taxonomy
4. Study of Systematic Taxonomy
5. Knowledge of Phytogeography

**Course Outcomes:** At the end of this course, students should be able to:

**CO1:** Demonstrate the techniques of section cutting, preparing slides, identifying of the material and drawing exact figures.

**CO2:** Compare and contrast the morphological, anatomical and reproductive features of vascular plants.

**CO3:** Identify the local angiosperms of the families prescribed to their genus and species level and prepare herbarium.

**CO4:** Exhibit skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are.

**CO5:** Prepare and preserve specimens of local wild plants using herbarium techniques.



1. Study/ microscopic observation of vegetative, sectional/anatomical and Reproductive structures of the following using temporary or permanent slides/ specimens/ mounts:
  - a. Pteridophyta: *Lycopodium* and *Marselia*
  - b. Gymnosperms: *Cycas* and *Gnetum*
2. Study of fossil specimens of Cycadeoidea and Pentoxylon (photographs /diagramscan be shown if specimens are not available).
3. Demonstration of herbarium techniques.
4. Systematic / taxonomicstudy of locally available plants belonging to the families prescribed in theory syllabus. (Submission of 30 number of Herbarium sheets of wildplants with the standard system is mandatory).
5. Mapping of phytogeographical regions of the globe and India.

**Textbook:**

1. A text book of Practical Botany-I Ashok Bendra and Ashok kumar
2. Practical manual of College Botany I and II- B.S..Reddy and S.M.Reddy

**Course Delivery method:** Face-to-

face / Blended.**Course has focus**

**on:** Skill Development **Websites of**

**Interest:**

<https://youtu.be/RJsOOhws5gI>

<https://youtu.be/9xtB1G4kISQ>

<https://youtu.be/2wFN9YmkBOQ>

**Model Question Paper Structure for SEE**

**Time: 3hrs.**

**Max. Marks 40M**

1. Take T.S. of the material 'A' (Pteridophyta), make a temporary slide and justify the identification with apt points.....**8M**
2. Take T.S. of the material 'B' (Gymnosperms), make a temporary slide and justify the identification with apt points.....**8M**
3. Describe the vegetative and floral characters of the material 'C' (Taxonomy of Angiosperms) and derive its systematic position.....**8M**
4. Identify the specimen 'D' (Fossil Gymnosperm) and give specific reasons.....**3M**

1. Locate the specified phytogeographical regions the world / India (E) map supplied to you

**2X2=4 M**

2. Record + Herbarium & amp; Field note book **5+4 = 9M**

NAAC reaccredited at 'A' level

*Autonomous -ISO 9001 – 2015 Certified*

Title of the Paper: **Plant Physiology and Metabolism**

**Semester: IV**

Course Code	<b>BOTT 41A</b>	Course Delivery Method	Class Room / Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2021-22	Year of Offering: 2021 - 22	Year of Revision: --	Percentage of Revision: -

**Course Prerequisites:** Knowledge of Plant Physiology and Metabolism at +2 level.

**Course Description:**

This course will provide one with a basic and comprehensive understanding of plant water relations. Enable the student with depth of topics and helps them to gain appreciation of the mineral nutrition, enzymes and respiration. On the other hand, importance of understanding photosynthesis and photorespiration are also learnt. A part from these the student will be enhanced with the knowledge of nitrogen and lipid metabolism. The course provides a vast knowledge in plant growth development and stress physiology.

**Course Objectives**

On successful completion of this course, the students will be able to:

1. To understand the plant water relations.
2. To understand the mineral nutrition, enzymes and respiration.
3. To understand the photosynthesis and photorespiration.
4. To understand the nitrogen and lipid metabolism.
5. To understand the plant growth-development and stress physiology.

**Course Outcomes:**

At the end of this course, students should be able to:

CO1: Comprehend the importance of water in plant life and mechanisms for transport of water and solutes in plants.

CO2: Evaluate the role of minerals in plant nutrition and their deficiency symptoms, Interpret the role of enzymes in plant metabolism.

CO3: Critically understand the light reactions and carbon assimilation processes responsible for synthesis of food in plants.

CO4: Analyze the biochemical reactions in relation to Nitrogen and lipid metabolisms.

CO5: Evaluate the phytohormones that regulate growth and development in plants, examine the role of light on flowering and explain physiology of plants under stress conditions.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<b>Plant-Water relations</b> 1. Importance of water to plant life, physical properties of water, diffusion, imbibitions, osmosis. Water potential, osmotic potential, pressure potential. 2. Absorption and lateral transport of water; Ascent of sap 3. Transpiration: stomata structure and mechanism of stomatal movements (K <sup>+</sup> -ion flux). 4. Mechanism of phloem transport; source-sink relationships.	12
II	<b>Mineral nutrition, Enzymes and Respiration</b> Essential macro and micro mineral nutrients and their role in plants; symptoms of mineral deficiency Absorption of mineral ions; passive and active processes. Characteristics, nomenclature and classification of Enzymes. Mechanism of enzyme action, enzyme kinetics. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, Mechanism of oxidative phosphorylation, Pentose Phosphate Pathway (HMP shunt).	12
III	<b>Photosynthesis and Photorespiration</b> 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; photo phosphorylation Carbon assimilation pathways (C <sub>3</sub> , C <sub>4</sub> and CAM); Photorespiration-C <sub>2</sub> pathway	12
IV	<b>Nitrogen and lipid metabolism</b> Nitrogen metabolism: Biological nitrogen fixation– asymbiotic and symbiotic nitrogen fixing organisms. Nitrogenase enzyme system. Lipid metabolism: Classification of Plant lipids, saturated and unsaturated fatty acids. Anabolism of triglycerides, $\beta$ -oxidation of fatty acids, Glyoxylate cycle.	12
V	<b>Plant growth-development and stress physiology</b> Growth and Development: Definition, phases and kinetics of growth. Physiological effect of Plant Growth Regulators (PGRs)- Auxins, Gibberellins, Cytokinins, ABA, Ethylene and Brassinolide. Physiology of flowering: Photoperiodism, role of phytochrome in flowering. Seed germination and senescence; physiological changes.	12

**Textbook:**

- Botany–IV(Vrukshasastram-II): Telugu Academy, Hyderabad
- Pandey,B.P. (2013)*College Botany, Volume-III*, S. Chand Publishing, New Delhi

**Recommended Reference book:**

- Aravind Kumar&S.S. Purohit (1998) *Plant Physiology – Fundamentals and Applications*, Agro Botanica, Bikaner
- Datta, S.C. (2007) *Plant Physiology*, New Age International (P)Ltd., Publishers, New Delhi

**Course Delivery method:** Face-to-face / Blended.

**Course has focus on:** Foundation

**Websites of Interest:**

[https://youtu.be/4to\\_4guDx50](https://youtu.be/4to_4guDx50)

<https://youtu.be/j0BN8RfeqD0>

<https://youtu.be/Uc4lDTd1JXs>

<https://youtu.be/LVxdoH9MLU4>

<https://youtu.be/MSsVrzYibI8>

<https://youtu.be/YoNgSOIsk0A>

**Co-curricular Activities:**

Question and answer session at the end of class.

Observing animations.

Written assignments.

Group Discussion (GD)/ Quiz.

Power Point Presentations.



**Max.: 75 Marks**

**Min. Pass: 30 Marks**

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**Section-A**

**Answer Any Five at least one from each unit**

**5 x 5M = 25Marks**

1. Identify role of Water potential in plants **CO1L2**
2. Carrier concept **CO2L1**
3. Oxidative phosphorylation **CO2L1**
4. CAM plants **CO3L1**
5. Emerson enhancement effect **CO3L1**
6. Classification of plant lipids **CO4L4**
7. Brassino steroids. **CO5L1**
8. Phytochrome **CO5L1**

**Section-B**

**Answer the following questions (5 x 10M = 50Marks)**

9. (a) Explain osmosis, diffusion and imbibition with the help of experiments. **CO1L2**  
or **Unit I**

(b) Explain the various theories on mechanism of stomatal movements. **CO1L2**

10. (a) Define enzymes. Illustrate the properties and structure. Mention the mechanism of enzyme action. **CO2L1**

or **Unit II**

(b) Explain the bio chemical reactions that occur in kreb's cycle. **CO2L1**

11. (a) Explain carbon assimilation how many methods of carbon assimilation are shown by plants explain carbon assimilation in C3 plants. **CO3L1**

or **Unit III**

(b) What is photorespiration? Differentiate photorespiration and respiration in plants? Explain photorespiration. **CO3L1**

12. (a) what is biological nitrogen fixation? Explain types of biological nitrogen fixation. **CO4L2**

or **Unit IV**

(b) what are lipids? Give an account of classification of plant lipids. **CO4L2**

13. (a) What are phyto hormones? Analyse the physiological effects of cytokinines. in plant growth. **CO5L4**

or **Unit V**

(b) What is photo periodism? Distinguish the role of phytochrome in physiology of flowering. **CO5L4**

**Course Prerequisites:** Knowledge of Plant Physiology and Metabolism at +2 level

**Course Description:** This course will provide one with a basic and comprehensive skill in understanding plant water relations. Enable the student with depth of topics and helps them to gain appreciation of the mineral nutrition, enzymes and respiration. On the other hand, importance of understanding photosynthesis and photorespiration are also learnt. A part from these the student will be enhanced with the knowledge of nitrogen and lipid metabolism. The course provides a vast knowledge in plant growth development and stress physiology.

**Course Objectives:**

On successful completion of this course, the students will be able to:

1. To understand the plant water relations.
2. To understand the mineral nutrition, enzymes and respiration.
3. To understand the photosynthesis and photorespiration.
4. To understand the nitrogen and lipid metabolism.
5. To understand the plant growth-development and stress physiology.

**Course Outcomes:**

At the end of this course, students should be able to:

CO1: Comprehend the importance of water in plant life and mechanisms for transport of water and solutes in plants.

CO2: Evaluate the role of minerals in plant nutrition and their deficiency symptoms, Interpret the role of enzymes in plant metabolism.

CO3: Critically understand the light reactions and carbon assimilation processes responsible for synthesis of food in plants.

CO4: Analyze the biochemical reactions in relation to Nitrogen and lipid metabolisms.

CO5: Evaluate the phyto hormones that regulate growth and development in plants, examine the role of light on flowering and explain physiology of plants under stress conditions.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<p>Determination of osmotic potential of plant cellsap by plasmolytic method using <i>Rhoeo</i> / <i>Tradescantia</i> leaves.</p> <p>Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.</p> <p>Determination of rate of transpiration using Cobalt chloride method / Ganong's potomete (at least for a dicot and a monocot).</p> <p>Effect of Temperature on membrane permeability by colorimetric method.</p> <p>Minor experiments– Osmosis, Arc-auxonometer, ascent of sap through xylem, cytoplasmic streaming.</p>	
II	<p>Study of mineral deficiency symptoms using plant material/photographs.</p> <p>Demonstration of amylase enzyme activity and study the effect of substrate and Enzyme concentration.</p> <p>Separation of chloroplast pigments using paper chromatography technique.</p> <p>Demonstration of Polyphenol oxidase enzyme activity (Potato tuber or Apple fruit)</p>	
III	<p>Anatomy of C3, C4 and CAM leaves</p> <p>Estimation of protein by biuret method/Lowry method</p>	

#### Textbook:

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.

#### Recommended Reference book:

1. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

**Course Delivery method:** Face-to-face / Blended.

**Course has focus on:** Skill Development.

#### Websites of Interest:

<https://youtu.be/VPwLN6U1spk>  
<https://youtu.be/wBDC8gFuobo>  
<https://youtu.be/Fi33E5sC0To>  
<https://youtu.be/Hc3Mg0Yc7kI>  
<https://youtu.be/IigeZ7PtWQU>  
<https://youtu.be/q50VbVyWy6o>  
<https://youtu.be/ug5p2CRqjDk>  
<https://youtu.be/W56RHxu2Hpc>  
<https://youtu.be/3PYdMaCIUmw>  
<https://youtu.be/VyKsT6q1O-s>  
<https://youtu.be/1kTbPx0WFIA>

#### Co-curricular Activities:

Question and answer session at the end of class.  
 Observing animations.  
 Written assignments.  
 Group Discussion (GD)/ Quiz.  
 Power Point Presentations.

### **Model Question Paper Structure for SEE**

**Max. Time: 3Hrs.**

**Max. Marks: 40**

1. Conduct the experiment 'A' (Major experiment), write aim, principle, material and apparatus/equipment, procedure, tabulate results and make conclusion. **15M**
2. Demonstrate the experiment 'B'(Minor experiment), write the principle, Procedure and give inference. **5M**
3. Identify the following with apt reasons. **3x4=12M**
  - C. Plant water relations /Mineral nutrition
  - D. Plant metabolism
  - E. Plant growth and development
4. Record +Viva-voce **5+3=8M**



**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF  
ARTS & SCIENCE, VUYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC recredited at 'A' level  
Autonomous –ISO 9001-2015 Certified

**Title of the Paper: Cell Biology, Genetics and Plant Breeding**

Course Code	<b>BOT T42A</b>	Course Delivery Method	Class Room / Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2021-22	Year of Offering: 2017 - 18	Year of Revision: -- 100%	Percentage of Revision: -

**Course Prerequisites:** Knowledge of Cell Biology, Genetics and Plant Breeding studied in intermediate.

**Course Description:** This course will provide one with a basic and comprehensive understanding of cell biology. Enable the student with depth of topics and helps them to gain an appreciation in the genetics. On the other hand, importance of understanding plant breeding provides an extensive knowledge to the student.

**Course Objectives:**

1. Knowledge of Cell Biology.
2. The study of Chromosomes.
3. The study of Mendelian and Non-Mendelian genetics.
4. Study of Structure and functions of DNA.
5. Knowledge of Plant breeding

**Course Outcomes:** At the end of this course, students should be able to:

CO1: Distinguish prokaryotic and eukaryotic cells and design the model of a cell.

CO2: Explain the organization of a eukaryotic chromosome and the structure of genetic material.

CO3: Demonstrate techniques to observe the cell and its components under a microscope.

CO4: Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.

CO5: Elucidate the role of extra-chromosomal genetic material for inheritance of characters.

Evaluate the structure, function and regulation of genetic material.

CO6: Understand the application of principles and modern techniques in plant breeding.

Explain the procedures of selection and hybridization for improvement of crops.

## Syllabus

### Course Details

Unit	Learning Units	Lecture Hours
I	<b>The Cell</b> 1. Cell theory; prokaryotic vs eukaryotic cell; animal vs plant cell; a brief account on ultra-structure of a plant cell. 2. Ultra-structure of cell wall. 3. Ultra-structure of plasma membrane and various theories on its organization. 4. Polymorphic cell organelles (Plastids); ultra structure of chloroplast. Plastid DNA.	12
II	<b>Chromosomes</b> 1. Prokaryotic vs eukaryotic chromosome. Morphology of a eukaryotic chromosome. 2. Euchromatin and Heterochromatin; Karyotype and ideogram. 3. Brief account of chromosomal aberrations - structural and numerical changes 4. Organization of DNA in a chromosome (solenoid and nucleosome models).	12
III	<b>Mendelian and Non-Mendelian genetics</b> 1. Mendel's laws of inheritance. Incomplete dominance and co-dominance; Multiple allelism. 2. Complementary, supplementary and duplicate gene interactions (plant-based examples are to be dealt). 3. A brief account of linkage and crossing over; Chromosomal mapping - 2 point and 3-point test cross. 4. Concept of maternal inheritance (Corren's experiment on <i>Mirabilis jalapa</i> );	12
IV	<b>Structure and functions of DNA</b> 1. Watson and Crick model of DNA. Brief account on DNA Replication (Semi-conservative method). 2. Brief account on Transcription, types and functions of RNA. Gene concept and genetic code and Translation. 3. Regulation of gene expression in prokaryotes - Lac Operon.	12
V	<b>Plant Breeding</b> 1. Plant Breeding and its scope; Genetic basis for plant breeding. Plant Introduction and acclimatization. 2. Definition, procedure; applications and uses; advantages and limitations of : (a) Mass selection, (b) Pure line selection and (c) Clonal selection. 3. Hybridization – schemes, and technique; Heterosis (hybrid vigour). 4. A brief account on Molecular breeding – DNA markers in plant breeding. RAPD, RFLP.	12

**Textbook:**

1. Botany – III (Vruksashastram-I): Telugu Akademi, Hyderabad
2. Pandey, B.P. (2013) *College Botany, Volume-III*, S. Chand Publishing, New Delhi
3. Ghosh, A.K., K. Bhattacharya & G. Hait (2011) *A Text Book of Botany, Volume-III*, New Central Book Agency Pvt. Ltd., Kolkata
4. Chaudhary, R. C. (1996) *Introduction to Plant Breeding*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

**Recommended Reference book:**

1. S. C. Rastogi (2008) *Cell Biology*, New Age International (P) Ltd. Publishers, New Delhi
2. P. K. Gupta (2002) *Cell and Molecular biology*, Rastogi Publications, New Delhi
3. B. D. Singh (2008) *Genetics*, Kalyani Publishers, Ludhiana
4. A. V. S. S. Sambamurthy (2007) *Molecular Genetics*, Narosa Publishing House, New Delhi
5. Cooper, G.M. & R.E. Hausman (2009) *The Cell – A Molecular Approach*, A.S.M. Press, Washington
6. Becker, W.M., L.J. Kleinsmith & J. Hardin (2007) *The World of Cell*, Pearson Education, Inc., New York
7. De Robertis, E.D.P. & E.M.F. De Robertis Jr. (2002) *Cell and Molecular Biology*, Lippincott Williams & Wilkins Publ., Philadelphia
8. Robert H. Tamarin (2002) *Principles of Genetics*, Tata McGraw – Hill Publishing Company Limited, New Delhi.
9. Gardner, E.J., M. J. Simmons & D.P. Snustad (2004) *Principles of Genetics*, John Wiley & Sons Inc., New York
10. Micklos, D.A., G.A. Freyer & D.A. Cotty (2005) *DNA Science: A First Course*, I.K. International Pvt. Ltd., New Delhi

**Course Delivery method:** Face-to-face / Blended.

**Course has focus on:** Foundation

**Websites of Interest:**

<https://youtu.be/LFyjJBiltFI>

<https://youtu.be/hUJZ4X3Hkbw>

<https://youtu.be/rBkE5SAL7IA>

**Co-curricular Activities:****Suggested co-curricular activities for Botany Core Course- 5 in Semester-IV:****A. Measurable:****a. Student seminars:**

1. Light microscopy: bright field and dark field microscopy.
2. Scanning Electron Microscopy (SEM).
3. Transmission Electron Microscopy (TEM).
4. Mitosis and Meiosis
5. Cell cycle and its regulation.
6. Cell organelles bounded by single membrane.
7. Prokaryotic chromosomes
8. Special types of chromosomes: Polytene, Lamp brush and B-chromosomes.
9. Different forms of DNA.
10. Gene mutations.
11. DNA damage and repair mechanisms.
12. Reverse transcription.
13. Protein structure.
14. Modes of reproduction in plants.
15. Modes of pollination in plants

**b. Student Study Projects:**

1. Study of mitotic cell cycle in roots of *Allium cepa*
2. Study of mitotic cell cycle in roots of *Aloe vera*
3. Observation of chromosomal aberrations in *Allium cepa* root cells exposed to industrial effluent(s).
4. Observation of chromosomal aberrations in *Allium cepa* root cells exposed to heavy metal(s).
5. Observation of polyembryony in *Citrus* spp. and *Mangifera indica*.

**c. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

**B. General:**

1. Field visit to Agriculture/Horticulture University/ Research station to observe Plant breeding methods.
2. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

RECOMMENDED ASSESSMENT OF STUDENTS:

**Recommended continuous assessment methods for all courses:**

Some of the following suggested assessment methodologies could be adopted. Formal assessment for awarding marks for Internal Assessment in theory.

**Formal:**

1. Assessment of practical skills
2. Individual and group project reports
3. Seminar presentations

## Model Question Paper Structure for SEE

**Max.: 75 Marks**

**Min.Pass: 30 Marks**

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### Section-A

**Answer Any Five at least one from each unit**

**5 x 5M = 25Marks**

1. Distinguish the difference between eukaryotic cell and prokaryotic cell. **CO1, L4.**
2. Explain the ultra-structure of Chloroplast. **CO1, L2.**
3. State the difference between euchromatin and heterochromatin. **CO2, L1.**
4. Explain 2-point test cross. **CO2, L2.**
5. Describe incomplete dominance. **CO3, L2.**
6. Discuss about the semi conservative method of DNA replication. **CO4, L6.**
7. What is pure line selection? Explain. **CO5, L1.**
8. Elucidate the role of RAPD in molecular breeding. **CO5, L2.**

### Section-B

**Answer the following questions**

**5 x 10M = 50Marks**

9. (a) Explain ultra structure of plasma membrane. **CO1, L2.**  
or  
**Unit I**  
(b) Explain the ultra structure of cell wall. **CO1, L2.**
10. (a) Write a detailed account of chromosomal aberrations. **CO2, L6.**  
or  
**Unit II**  
(b) Describe the organization of DNA in a chromosome (solenoid and nucleosome models). **CO2, L2.**
11. (a) Design a detailed account on Linkage. **CO3, L5.**  
or  
**Unit III**  
(b) Compose a detailed account on Crossing Over. **CO3, L5.**
12. (a) Discuss about the Watson and Crick model of DNA. **CO4, L6.**  
or  
**Unit IV**  
(b) Elucidate the regulation of gene expression in prokaryotes - Lac Operon. **CO4, L2.**
13. (a) Develop a note on advantages and limitations of : (a) Mass selection, (b) Pure line selection. **CO5, L3.**  
or  
**Unit V**  
(b) Explain the process of Hybridization, with respect to the schemes and techniques. **CO5, L2.**



**A. G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, Vuyyuru - 521165.**

NAAC reaccredited at 'A' level

*Autonomous -ISO 9001 – 2015 Certified*

Title of the Paper: **Cell Biology, Genetics and Plant Breeding (practicals)**

**Semester:** IV

**Credits:** 02

**Hours Taught:** 30 hrs. Per Semester

**Max.Time:** 3 Hours

**Course Prerequisites:** Knowledge of Cell Biology, Genetics and Plant Breeding studied in intermediate.

**Course Description:** This course will provide one with a basic and comprehensive understanding of cell biology. Enable the student with depth of topics and helps them to gain an appreciation in the genetics. On the other hand, importance of understanding plant breeding provides an extensive knowledge to the student.

**Course Objectives:**

1. Knowledge of Cell Biology.
2. The study of Chromosomes.
3. The study of Mendelian and Non-Mendelian genetics.
4. Study of Structure and functions of DNA.
5. Knowledge of Plant breeding.

**Course Outcomes:** At the end of this course, students should be able to:

CO1: Distinguish prokaryotic and eukaryotic cells and design the model of a cell.

CO2: Explain the organization of a eukaryotic chromosome and the structure of genetic material.

CO3: Demonstrate techniques to observe the cell and its components under a microscope.

CO4: Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.

CO5: Elucidate the role of extra-chromosomal genetic material for inheritance of characters.

Evaluate the structure, function and regulation of genetic material.

CO6: Understand the application of principles and modern techniques in plant breeding.

Explain the procedures of selection and hybridization for improvement of crops.

## Syllabus

1. Study of ultra-structure of plant cell and its organelles using Electron microscopic Photographs/models.
2. Demonstration of Mitosis in *Allium cepa*/*Aloe vera* roots using squash technique; observation of various stages of mitosis in permanent slides.
3. Demonstration of Meiosis in P.M.C.s of *Allium cepa* flower buds using squash technique; observation of various stages of meiosis in permanent slides.
4. Study of structure of DNA and RNA molecules using models.
5. Solving problems monohybrid, dihybrid, back and test crosses.
6. Solving problems on gene interactions (at least one problem for each of the gene interactions in the syllabus).
7. Chromosome mapping using 3- point test cross data.
8. Demonstration of emasculation, bagging, artificial pollination techniques for hybridization.

**Course Delivery method:** Face-to-face / Blended.

**Course has focus on:** Skill Development

**Websites of Interest:**

<https://youtu.be/LFyjJBiltFI>

<https://youtu.be/hUJZ4X3Hkbw>

<https://youtu.be/rBkE5SAL7IA>

## Model Question Paper Structure for SEE

**Time: 3hrs.**

**Max. Marks 40M**

1. Make a cytological preparation of given material 'A' (mitosis or meiosis in Onion) by squash technique, report any two stages, draw labelled diagrams and write the reasons. **10M**
2. Solve the given Genetic problem (Dihybrid cross/ Interaction of genes/ 3-point test cross) 'B' and write the conclusions. **10M**
3. Identify the following and justify with apt reasons. **3x4 =12M**  
C. Cell Biology (Cell organelle)  
D. Genetics (DNA/RNA)  
E. Plant Breeding
4. Record + Viva-voce **5 + 3 =8M**