

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNADt, A.P.(AUTONOMOUS).
NAAC Reaccredited at 'A' level

Autonomous-ISO9001-2015 Certified

DEPARTMENT OF BOTANY



BOS MEETING 04 - 03- 2024

ACADEMIC YEAR - (2023-24)

EVEN SEM – II, IV & VI

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
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BOARD OF STUDIES MEETING: 04th March 2024

The Board of studies meeting of Department of Botany was convened at 2:00 pm on 04 /03/2024 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 2023-2024, during the II, IV, & VI semester for the academic year 2023-2024 through online.

The following members were present.

S.No	Name	Designation	signature
1.	Smt. Ch. Beulah Ranjani Head, Department of Botany A.G&S.G.S Degree College Vuyyuru.	Chair person	C. B. Ranjani
2	prof. Avasan Maruthi Bio Sciences & Bio technology Krishna University Machilipatnam.	University Nominee	
3.	Sri Dr. Ch. Srinivasa Reddy Lecturer in Botany SRR & CVR Govt. Degree College, Vijayawada.	Subject Expert	ch Srinivasa Reddy
4.	P. Srinivasa Rao Department of Botany, P.B. Siddhartha College,	Subject Expert	P. Srinivasa Rao
5.	Sri. S. Krishna Suman, Natural farmer, yakamuru Vuyyuru.	Industrialist	
6.	Sri. N. Ramana Rao Lecturer in Botany, A.G &S.G.S Degree College Vuyyuru.	Member	N. Ramana Rao
7	Mr.N.T.V.Mahesh (P.G Chemistry) Student nominee A.G &S.G.S Degree College Vuyyuru	Student Represent	

BOTANY

Agenda:

1. To recommend the syllabi (Theory & Practical) for Second Semester of **I B.Sc. Botany Major of B.Sc. Honours** for the academic year 2023 -2024.
2. To recommend the Model Question paper, Blue Print and Guidelines for Question paper setters for Second Semester of **I B.Sc. Botany Major of B.Sc. Honours (major -3 & major -4)** for the academic year 2023–2024.
3. To recommend the syllabi (Theory & Practical), Model question paper, Blue Print and Guidelines for Question paper setters for IV Semester of II B.Sc. (B.Z.C & ABC) for the academic year 2023 - 2024.
4. To recommend the syllabi (Theory & Practical), Model question paper, Blue Print and Guidelines for Question paper setters for VI Semester of III B.Sc. ABC for the academic year 2023-24
5. To implement semester end internship for III B.Z.C in VI semester.
6. To introduce Value Added Course (Non-Credits) on mushroom cultivation for IV Semester of II B.Sc. (BZC & ABC) for the academic year 2023 - 2024.
7. To introduce Environmental Education for II Semester of (I B.A, I B.COM, BOTANY, ZOOLOGY, AQUA, PHYSICS, CHEMISTRY, MATHS HONORS) for the academic year 2023 - 2024.
8. To recommend the teaching and evaluation methods to be followed under Autonomous status.
9. Any other matter.

CH. Beulah Rajani

Chairman

RESOLUTIONS:

1. It is resolved to implement the syllabi prescribed by APSCHE for Second Semester of **I B.Sc. Botany Major of B.Sc. Honors** for the academic year 2023-2024 without any changes. Paper -3(**Origin of Life**) & paper 4 (**Non-vascular Plants and Diversity of Microbes**).
2. It is resolved to implement the model question paper, Blue Print and Guide lines for Question paper setters for Second Semester of I B.Sc. **Botany** Major of B.Sc. Honors for the academic year 2023-2024 as recommended by BOS members.
3. It is resolved to continue the same syllabus (Theory & Practical), Model question paper, Blue Print and Guidelines for Question paper setters for IV Semester of II B.Sc. (B.Z.C & ABC) for the academic year 2023-2024.
4. It is resolved to continue the same syllabus (Theory & Practical), Model question paper, Blue Print and Guidelines for Question paper setters for VI Semester of III B.Sc. (ABC) for the academic year 2023- 2024.
5. It is resolved to implement semester end internship for III B.Sc B.Z.C in VI Semester.
6. It is resolved to introduce Value Added Course (Non-Credits) on mushroom cultivation for VI Semester of III B.Sc ABC for the academic year 2023 - 2024.
7. It is resolved to implement **Environmental Education** for II Semester of (I B.A,I B.COM,BOTANY ,ZOOLOGY, AQUA ,PHYSICS,CHEMISTRY,MATHS HONORS) for the academic year 2023 - 2024.
8. It is resolved to implement the following Teaching and Evaluation methods to be followed under Autonomous status.

Evaluation procedure:

Internal Assessment Examination:

- Out of maximum 100 marks in each paper for I B.Sc. **Botany** Major of B.Sc. Honours 30 marks is allocated for internal assessment.
- ❖ Out of these 30 marks, 20 marks are allocated for Announced tests (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.
- ❖ Out of maximum 100 marks in each paper for III Semester of II B.Sc, BZC & ABC 30 marks shall be allocated for internal assessment.
- ❖ Out of these 30 marks, 20 marks are allocated for announced tests (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 assignment and remaining 5 marks seminar for IV semester. There is no pass minimum for internal assessment for IV Semester.
- ❖ Out of maximum 100 marks in each paper for VI Semester of III B.Sc. BZC & ABC 30 marks shall be allocated for internal assessment.
- ❖ Out of these 30 marks, 20 marks are allocated for announced tests (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 assignment and remaining 5 marks seminar for VI semester. There is no pass minimum for internal assessment for VI Semester.

❖ **Semester-End Examination:**

- ❖ The maximum mark for II semester – End examination shall be 70 marks and duration of the examination shall be 3 hours.
- ❖ 70 marks are allocated for II Semester of First B.Sc. **Botany** Major of B. Sc. Honours in Semester end Examination. 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".
- ❖ 70 marks are allocated for IV Semester of second B.Sc. BZC & ABC in Semester End Examination. 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".
- ❖ 70 marks are allocated for VI Semester of III B.Sc. ABC in Semester End Examination. 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".

CH. Beulah Rajani

Chairman

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU (AUTONOMOUS)**

COURSESTRUCTURE– 2023 - 2024

Semester	Course Code	Course Title	Hours/Week	CIA	SEE	No. of Credits	Core/LSC/SDC/MDC Elective/Cluster
II	23BOMAL121	Non-vascular Plants –(T) (Algae, Fungi, Lichens and Bryophytes)	3	30	70	3	Core
	23BOMAP122	Non-vascular Plants –(P)	2	30	70	1	Lab
	23BOMAL122	Origin of Life and Diversity of Microbes –(T)	3	30	70	3	Core
	23BOMAP122	Origin of Life and Diversity of Microbes –(P)	2	30	70	1	Lab
IV	BOTT41A	Plant physiology and Metabolism	4	30	70	4	Core
	BOTT41P	Practical-III	2	10	40	2	Lab
IV	BOTT42A	Cell biology ,Genetics and plant Breeding	4	30	70	4	Core
	BOTT42P	Practical-III	2	10	40	2	Lab
V	SECBOTT01	Plant tissue culture	3	30	70	4	Core
	SECBOTP01	Practical	3	10	40	1	Lab
V	SECBOTT02	Mushroom cultivation	3	30	70	4	Core
	SECBOTP02	Practical	3	10	40	1	Lab
II	23BOCVL121	Environmental Education	2	15	35	2	LSC
IV	VACBOTPN-03	Plant nursery	--	--	--	--	---

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Botany Honours

Title of the Paper: Non-vascular Plants (Algae, Fungi, Lichens and Bryophytes)

Semester:-II

Course Code	23BOMAL121	Course Delivery Method	Class Room/Blended Mode-Both
Credits	3	CIA Marks	30
No. of Lecture Hours/Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: 2024-2025	Year of Offering 2023-2024	Year of Revision- 0%	Percentage of Revision:0%

Learning objectives

I. Learning Objectives: By the end of this course the learner has:

1. To realize the characteristics and diversity of non-vascular plants.
2. To recognize the ecological and economic value of algae, fungi, lichens and bryophytes.
3. To inquire the habit, habitat, morphological features and life cycles of selected genera of non-vascular plants.

Course Objectives:

CO:1	Compile the general characteristics of algae and their significance in nature.
CO: 2	Distinguish the characteristics of different groups of fungi.
CO:3	Elaborate the features and significance of amphibians of plant kingdom
CO:4	Explain the diversity among non-vascular plants.
CO:5	Distinguish the characteristics of different groups of fungi.

Unit	Learning Units	Hours
I	<p>Unit1: Introduction to Algae General Characteristics of algae: Occurrence and distribution, cell structure, pigments, flagella and reserve food material. Classification of algae: F.E. Fritsch (1935) and Lee (2008) Thallus organization and life cycles in algae. Ecological and economic importance of algae.</p>	8 HRS
II	<p>Unit2: Biology of selected Algae Occurrence, structure, reproduction and life cycle of: (a) Chlorophyceae: <i>Spirogyra</i> (b) Phaeophyceae: <i>Ectocarpus</i> (c) Xanthophyceae: <i>Vaucheria</i> (d) Rhodophyceae: <i>Polysiphonia</i> A brief account of Bacillariophyceae Culture and cultivation of <i>Chlorella</i>.</p>	10HRS
III	<p>Introduction to Fungi General characteristics of fungi and Ainsworth (1973) classification. Thallus organization and nutrition in fungi. Reproduction in fungi (asexual and sexual); Heterothallism and parasexuality. Ecological and economic importance of fungi.</p>	8 HRS
IV	<p>Biology of selected Fungi Occurrence, structure, reproduction and life cycle of: (a) Mastigomycotina: <i>Phytophthora</i> (b) Zygomycotina: <i>Rhizopus</i> (c) Ascomycotina: <i>Penicillium</i> (d) Basidiomycotina: <i>Puccinia</i> Occurrence, structure and reproduction of lichens; ecological and economic importance of lichens.</p>	10HRS
V	<p>Biology of Bryophytes General characteristics of Bryophytes; Rothmaler (1951) classification. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) Hepaticopsida: <i>Marchantia</i> (b) Anthocerotopsida: <i>Anthoceros</i> (c) Bryopsida: <i>Funaria</i> General account on evolution of sporophytes in Bryophyta.</p>	9HRS

1. Text Books:

1. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi
2. Hait, G., K. Bhattacharya & A.K. Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata

Reference Books:

1. Fritsch, F.E. (1945) The Structure & Reproduction of Algae (Vol. I & Vol. II) Cambridge University Press Cambridge, U.K.
2. Bold, H.C. & M. J. Wynne (1984) Introduction to the Algae, Prentice-Hall Inc., New Jersey
3. Robert Edward Lee (2008) Phycology. Cambridge University Press, New York
4. Van Den Hoek, C., D.G. Mann & H.M. Jahns (1996) Algae : An Introduction to Phycology. Cambridge University Press, New York.
5. Alexopoulos, C.J., C.W. Mims & M. Blackwell (2007) Introductory Mycology, Wiley & Sons, Inc., New York.
6. Mehrotra, R.S. & K. R. Aneja (1990) An Introduction to Mycology. New Age International Publishers, New Delhi.
7. Kevin Kavanagh (2005) Fungi; Biology and Applications John Wiley & Sons, Ltd., West Sussex, England.
8. John Webster & R. W. S. Weber (2007) Introduction to Fungi, Cambridge University Press, New York.
9. Shaw, A.J. & B. Goffinet (2000) Bryophyte Biology .Cambridge University Press, New York.

Suggested activities and evaluation methods:

Unit-1: Activity: Algae specimen collection from any water bodies in their locality, recording the characteristics, identification and classifying them according to Fritsch system.

Evaluation method: Evaluating the presentation or report summarizing findings.

Unit-2: Activity: Microscopic observations and recording distinguishing characters of any six algal forms excluding the genera in the syllabus.

Evaluation method: Conducting a Quiz or an exam/ evaluating the chart or drawings or summarized data on similarities and differences.

Unit-3: Activity: Collection or laboratory culture of fungi and reporting the important features.

Evaluation method: Evaluating the report/ conducting JAM/ Quiz/ Group discussion.

Unit-4: Activity: Microscopic observations and summarizing the salient features of the fungal genera and lichen forms in the syllabus.

Evaluation method: Conducting a Quiz or an exam/ evaluating the chart or drawings or concise data on similarities and differences.

Unit-5: Collection, characterization, identification and classification of any four bryophytes from their native locality or college campus.

Evaluation method: Assessment of observations and documentation accuracy/ presentation or report summarizing findings based on a rubric.

PRACTICAL PAPER

Course 3: Non-vascular Plants (Algae, Fungi, Lichens, and Bryophytes)

II Semester

23BOMAP121

Credits -1

I. Course Outcomes:

On successful completion of this practical course, student shall be able to:

1. Identify some algal and fungal species based on the structure of thalli and reproductive organs.
2. Decipher the lichens and Bryophytes based on morphological, anatomical and reproductive features.

II. Laboratory/field exercises:

Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts:

1. **Algae:** *Spirogyra*, *Ectocarpus*, *Vaucheria* and *Polysiphonia*; a centric and a pennate diatom.
2. Demonstration of culture and cultivation of *Chlorella*
3. Identification of some algal products available in local market.
4. **Fungi:** *Phytophthora*, *Rhizopus*, *Penicillium* and *Puccinia*
5. Identification of some fungal products available in the local market.
6. **Lichens:** Crustose, foliose and fruticose
7. **Bryophyta:** *Marchantia*, *Anthoceros* and *Funaria*.

I SEMESTER ENDEXAMINATIONS

PAPER-III

MODEL PAPER

Course Code: 23BOMAL121

Title of the paper: **Non-vascular Plants (Algae, Fungi, Lichens, and Bryophytes)**

Time: 3 Hours

Max. Marks: 70

Draw neat labeled diagrams wherever necessary.

SECTION -A

- Answers any **FIVE** of the following 5x4=20M
1. (a) Reserve food material in Algae. 4M
OR
(b) Pigments, flagella in algae.
 2. (a) Aplanospores in vaucheria 4M
OR
(b) Cystocarp
 3. (a) Hetero thalium and homothallium 4M
OR
(b) Fertilization,
 4. (a) genetic code 4M
OR
(b) Cell theory
 5. (a) Persistent Apices 4M
OR
(b) T.S of gemma cup

SECTION - B

Answer any **FOUR** of the following 5X 10 = 50Marks.

1. (a) Write about economic importance of algae?
OR
(b) Explain the Thallus organization in algae.
2. (a) Write an essay on life cycle of Ectocarpus
OR
(b) Give an account on Culture and cultivation of Chlorella?
3. (a) Explain the economic importance of fungi?
OR
(b) Write an essay on Thallus organization and nutrition in fungi?
4. (a) Write an essay on life cycle of Penicillium.
OR
(b) Explain ecological and economic importance of lichens.
5. (a) Give an account on evolution of Sporophytes in Bryophyta?
OR
(b) Write about Funaria L. S of capsule?

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Title of the Paper: **Origin of Life and Diversity of Microbes**

Semester: - II

Course Code	23BOMAL122	Course Delivery Method	Class Room/Blended Mode-Both
Credits	3	CIA Marks	30
No.of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: 2024-2025	Year of Offering 2023-2024	Year of Revision-	Percentage of Revision:0%

Learning objective: By the end of this course the learner has

1. To get awareness on origin and evolution of life.
2. To understand the diversity of microbial organisms.
3. To get awareness on importance of microbes in nature and agriculture.

II. Learning Outcomes: On completion of this course students will be able to:

CO: 1	Illustrate diversity of viruses, multiplication and economic value.
CO:2	Discuss the general characteristics, classification and economic importance of special groups of bacteria.
CO:3	Explain the structure, nutrition, reproduction and significance of eubacteria.
CO: 4	Evaluate the interactions among soil microbes.
CO: 5	Compile the value and applications of microbes in agriculture.

Unit	Learning Units	Lecture Hours						
I	<p>Origin of life and Viruses</p> <p>Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. discovery of microorganisms, Pasteur experiments, germ theory of diseases.</p> <p>Five kingdom classification of R.H. Whittaker</p> <p>Shape and symmetry of viruses; structure of TMV and Gemini virus.</p> <p>Multiplication of TMV; A brief account of prions, viroids and virusoids;</p> <p>Transmission of plant viruses and their control.</p> <p>Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.</p>	10 HRS						
II	<p>Special groups of Bacteria</p> <p>General characteristics, outline classification and economic importance of following special groups of bacteria:</p> <table border="0" data-bbox="295 817 1149 891"> <tr> <td>a) Archaeobacteria</td> <td>b) Chlamydiae</td> <td>c) Actinomycetes</td> </tr> <tr> <td>d) Mycoplasma</td> <td>e) Phytoplasma</td> <td>f) Cyanobacteria</td> </tr> </table> <p>Culture and cultivation of <i>Spirulina</i></p>	a) Archaeobacteria	b) Chlamydiae	c) Actinomycetes	d) Mycoplasma	e) Phytoplasma	f) Cyanobacteria	7 HRS
a) Archaeobacteria	b) Chlamydiae	c) Actinomycetes						
d) Mycoplasma	e) Phytoplasma	f) Cyanobacteria						
III	<p>Eubacteria:</p> <p>Occurrence, distribution and cell structure of eubacteria.</p> <p>Classification of Eubacteria based on nutrition.</p> <p>Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).</p> <p>Economic importance of Eu-bacteria with reference to their role in Agriculture and industry (fermentation and medicine).</p>	8 HRS						
IV	<p>Soil microbes – interactions</p> <p>Distribution of soil microorganisms in soil.</p> <p>Factors influencing the soil micro flora - Role of microorganisms in soil fertility.</p> <p>Interactions among microorganisms, mutualism, comensalism, competition, amensalism, parasitism, predation.</p> <p>Microorganisms of rhizosphere, phyllosphere and spermophere; microbial interactions and their effect on plant growth.</p>	10 HRS						
V	<p>Microbes in agriculture</p> <p>Mass production, mode of applications, advantages and limitations of bacterial inoculants (<i>Rhizobium</i>, <i>Azotobacter</i>, <i>Azospirillum</i>, Cyanobacteria).</p> <p>Role of Frankia and VAM in soil fertility.</p> <p>Microbial biopesticides: mode of action, factors influencing, target pests; microbial herbicides.</p>	10 HRS						

I. Text Books:

1. Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial Diversity, Kalyani Publishers, New Delhi.
2. Dubey, R.C. & D. K. Maheswari (2013) A Text Book of Microbiology, S.Chand & Company Ltd., New Delhi
3. Toshniwal, R.L. (2007) Agricultural Microbiology, Agrobios (India), Jodhpur

II. Reference Books:

1. Pelczar Jr., M.J., E.C.N. Chan & N. R. Krieg (2001) Microbiology, Tata McGraw- HillCo, New Delhi
2. Prescott, L. Harley, J. and Klein, D. (2005) Microbiology, Tata McGraw –Hill Co. New Delhi.
3. Gyaneshwar, A.D., G.J. Parekh, and V.S. Reddy (2004) Agricultural Microbiology: Plant-Soil Interactions, Research Signpost, Kerala, India
4. Zaki A. Shuler and Zainul Abid (2014) Agricultural Microbiology: Principles and Applications, CRC Press, Boca Raton, Florida, USA

III. Suggested activities and evaluation methods:

Unit-1: Activity: Collecting scientific literature on historical developments in microbiology.

Evaluation method: Evaluating the report based on a rubric.

Unit-2: Activity: Group discussion on various groups of special bacteria.

Evaluation method: Assessment of active participation, soft skills, communication skills, collaborative skills, time management etc., of a group or a student based on a rubric.

Unit-3: Activity: Presentation or poster summarizing the classification of Eu-bacteria based on nutrition.

Evaluation method: Assessment based on accuracy and understanding.

Unit-4: Activity: Microscopic observation of bacterial samples from soil/ phylloplane in their native place/ college campus.

Evaluation method: Evaluating the report on characteristics and classification of eubacteria.

Unit-5: Activity: Culture and mass production of bioinoculants.

Evaluation method: Skills performed in establishing the culture and mass production.

II SEMESTER END EXAMINATIONS

PAPER-IV

MODEL PAPER

Course Code: 23BOMAL121

Title of the paper: Origin of Life and Diversity of Microbes

Time: 3Hours

Max.Marks:70

Draw neat labeled diagrams wherever necessary.

SECTION -A

Answer and FIVE of the following

5X4=20Marks

1. (a) Germ Theory of diseases . 4M

OR

(b) Structure of T.M.V. 4M
2. (a) Archaeobacteria. 4M

OR

(b) Mycoplasma 4M
3. (a) Conjugation in bacteria. 4M

OR

(b) Endospore formation. 4M
4. (a) Role of micro organism in soil fertility. 4M

OR

(b) Commensalism 4M
5. (a) *Rhizobium* 4M

OR

(b) Uses of VAM in soil fertility. 4M

SECTION - B

Answer any Five of the following

5X10=50 Marks

1. (a). Describe Theories in origin of life.

OR

(b) Write an essay on transmission plant viruses.
2. (a) Economic importance of cyano bacteria?

OR

(b) Give an account on Culture and cultivation of *Spirulina*?
3. (a) Describe the reproduction in bacteria?

OR

(b) Economic importance of bacteria and their role in Agriculture and industry.
4. (a) Role of microorganisms in soil fertility?

OR

(b) Write an essay on microbial interactions and their effect on plant growth?
5. (a) Write about advantages and limitations of bacterial inoculants.

OR

(b) Give an account on Microbial biopesticides.

Title of the paper: Origin of Life and Diversity of Microbes

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Take all necessary precautions in the microbiology laboratory.
2. Handle the instruments and prepare media for laboratory work.
3. Identify various microbes through microscopic observations

II. Laboratory/Field exercises:

1. Microbiology good laboratory practices and biosafety.
2. Study the principle and applications of important instruments (autoclave, hot air oven, incubator, Inoculation loop, Inoculation needle, membrane filter, laminar air flow system, colony counter. biological safety cabinets, BOD incubator, pH meter) used in the microbiology laboratory.
3. Study of Viruses (Gemini and TMV) using electron micrographs/ models.
4. Gram staining technique of Bacteria.
5. Microscopic study of Cyanobacteria using temporary/permanent slides.
6. Microscopic study of Eubacteria using temporary/permanent slides.
7. Study of Archaeobacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.

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

Semester: IV

Course Code	BOTT 41A	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	<p>Plant-Water relations</p> <p>1. Importance of water to plant life, physical properties of water, diffusion, imbibitions, osmosis. Water potential, osmotic potential, pressure potential.</p> <p>2. Absorption and lateral transport of water; Ascent of sap</p> <p>3. Transpiration: stomata structure and mechanism of stomatal movements (K^+ ion flux).</p> <p>4. Mechanism of phloem transport; source-sink relationships.</p>	12
II	<p>Mineral nutrition, Enzymes and Respiration</p> <p>Essential macro and micro mineral nutrients and their role in plants; symptoms of mineral deficiency</p> <p>Absorption of mineral ions; passive and active processes.</p> <p>Characteristics, nomenclature and classification of Enzymes. Mechanism of enzyme action, enzyme kinetics.</p> <p>Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, Mechanism of oxidative phosphorylation, Pentose Phosphate Pathway (HMPshunt).</p>	12
III	<p>Photosynthesis and Photorespiration</p> <p>Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect</p> <p>Concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; photo phosphorylation</p> <p>Carbon assimilation pathways (C_3, C_4 and CAM);</p> <p>Photorespiration-C_2 pathway</p>	12
IV	<p>Nitrogen and lipid metabolism</p> <p>Nitrogen metabolism: Biological nitrogen fixation– asymbiotic and symbiotic nitrogen fixing organisms. Nitrogenase enzyme system.</p> <p>Lipid metabolism: Classification of Plant lipids, saturated and unsaturated fatty acids.</p> <p>Anabolism of triglycerides, β-oxidation of fatty acids, Glyoxylate cycle.</p>	12
V	<p>Plant growth-development and stress physiology</p> <p>Growth and Development: Definition, phases and kinetics of growth.</p> <p>Physiological effect of Plant Growth Regulators (PGRs)- Auxins, Gibberellins, Cytokinins, ABA, Ethylene and Brassino steroids.</p> <p>Physiology of flowering: Photoperiodism, role of phytochrome in flowering.</p> <p>Seed germination and senescence; physiological changes.</p>	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 AgeInternational (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/j0BN8RfegD0>

<https://youtu.be/Uc4IDTd1JXs>

<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.

Model Question Paper Structure for SEE

Max.: 75 Marks

Min. Pass: 30 Marks

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**

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NAAC recredited at 'A' level

Autonomous -ISO 9001 – 2015 Certified

Title of the Paper: **Plant Physiology and Metabolism (practicals)**

.....

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

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**

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

Course Code	BOT T42A	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: --	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	Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.
CO4	Elucidate the role of extra-chromosomal genetic material for inheritance of characters. Evaluate the structure, function and regulation of genetic material
CO5	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	<p>The Cell</p> <ol style="list-style-type: none"> 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	<p>Chromosomes</p> <ol style="list-style-type: none"> 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	<p>Mendelian and Non-Mendelian genetics</p> <ol style="list-style-type: none"> 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	<p>Structure and functions of DNA</p> <ol style="list-style-type: none"> 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	<p>Plant Breeding</p> <ol style="list-style-type: none"> 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 (Vrukshasastram-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. Sambamurty (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/LFvjJBiltFI>

<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 poly embryony 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

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.**

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NAAC reaccredited at 'A' level

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

Semester: IV

Taught: 30 hrs. Per Semester

Credits: 02 Hours

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**

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Title of the Paper: **Plant tissue culture**

Semester:-VI

Course Code	BOTSE01	Course Delivery Method	Class Room/Blended Mode - Both
Credits	4	CIA Marks	25
No. of Lecture Hours/Week	3	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction:2022-23	Year of Offering 2022-2023	YearofRevision–2023- 24	Percentage of Revision:0%

Type of the Course: Skill Enhancement Course (Elective: Theory),

Course Outcomes: Students at the successful completion of the course will be able to:

CO1	Comprehend the basic knowledge and applications of plant tissue culture.
CO2	Identify various facilities required to setup a plant tissue culture laboratory.
CO3	Acquire a critical knowledge on sterilization techniques related to plant tissue culture.
CO4	Demonstrate skills of callus culture through hands on experience.
CO5	Understand the bio transformation technique for production of secondary metabolites.

Syllabus

Course Details:

Unit	Learning Units	Lecture Hours
I	<p>Basic concepts of plant tissue culture Plant tissue culture: Definition, history, scope and significance. Totipotency, differentiation, dedifferentiation, and redifferentiation; types of cultures. Infra structure and equipment required to establish a tissue culture laboratory.</p>	12
II	<p>Sterilization techniques and culture media Aseptic conditions – Fumigation, wet and dry sterilization, UV sterilization, ultra filtration. Nutrient media: Types of media. Composition and preparation of Murashige and Skoog culture medium.</p>	12
III	<p>Callus culture technique Explant: Definition, different explants for tissue culture, surface sterilization, inoculation methods. Callus culture: Definition, various steps in callus culture. Soma clonal variations and their isolation.</p>	12
IV	<p>Micro propagation Direct and indirect morphogenesis, organogenesis, role of PGRs; Somatic embryogenesis and synthetic seeds. Protoplast Culture. Cybrids.</p>	12
V	<p>Applications of plant tissue culture Germ plasm conservation: cryopreservation methods, slow growth, applications and limitations; cryo protectants. r DNA Technology. Transgenic plants - gene transfer methods, BT cotton, Golden Rice.</p>	12

-References/Text Book /e-books/websites:

1. Razdan, M.K.(2005)Introduction to Plant Tissue Culture, Oxford & IBH Publishers, Delhi
2. Bhojwani, S.S.(1990) Plant Tissue Culture: Theory and Practical (a revised edition).Elsevier Science Publishers, New York, USA.

Reference Materials on the Web / web links:

<https://www.youtube.com/watch?v=dFrX-t5JOPA>

<https://www.youtube.com/watch?v=A6qEgc6Jt3Q>

Co – Curricular Activities

A) Mandatory:(Training of students by teacher in field related skills:(lab:10+field:05)

1. **For Teacher:** Training of students by teacher in the laboratory/field for a total of not less than 15 hours on the field techniques/skills of sterilization procedures, preparation of media, establishment of callus culture, growth measurements; morphogenesis and organogenesis; acclimatization and hardening of plantlets.
2. **For Student:** Students shall (individually) visit anyone of plant tissue culture laboratories in universities/research organizations/private facilities, write their observations on tools, techniques, methods and products of plant tissue culture; and submit a hand-written Fieldwork/Project work Report not exceeding 10 pages to the teacher in the given format.
3. Max marks for Fieldwork/Project work Report: 05
4. Suggested Format for Fieldwork/Project work Report: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying tools in plant tissue culture and their handling, operational techniques with safety and security, IPR)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on tools and techniques in plant tissue culture.
5. Collection of material/figures/photos related to products of plant tissue culture, writing and organizing them in a systematic way in a file.
6. Visits to plant tissue culture/biotechnology laboratories in universities, research organizations, private firms, etc.
7. Invited lectures and presentations on related topics by field/industrial experts.

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TITLE OF THE PAPER: PLANT TISSUE CULTURE

Model Question Paper

Max.Time:3Hrs.

Course Code: BOTSE01

Max.Marks:75M

SECTION–A

Answer any FIVE of the following questions.

5x5=25Marks

(Draw diagrams wherever necessary)

Each answer carries 5marks. Atleast1question should be given from each Unit

1. What is totipotency? Explain.CO1L4.
2. Describe the method of dry sterilization.CO2L1.
3. Enumerate the soma clonalvariations.CO3,L1.
4. Discuss about the cybrids.CO4, L2.
5. Prepare a note on role of auxins.CO5,L3.
6. State a note on Bt Cotton.CO5,L1.
7. What is morphogenesis? Describe.CO4,L1.
8. Describe the synthetic seeds in detail.CO4,L1.

SECTIONB

5x10 =50Marks

Answer allquestions.Eachanswercarries10marks.Twoquestionsshouldbegiven from each unit with internal choice.

9. (a) State the concepts differentiation, dedifferentiation, andRedifferentiation.CO1,L1
OR
(b) Enumerate an account of Infrastructure and equipment required to establish a tissue culture laboratory.CO1, L1
- 10.(a) Explain various methods of sterilization.CO2, L4
OR
(b)Discriminate an account ofthecompositionandpreparationofMSmedia.CO2, L4
- 11.(a)Paraphrasevariouswaysofsurfacesterilizationofexplants.CO3,L2
OR
(b)Summarizeanaccountofcallusculture.CO3, L2
12. (a) Illustrate about somatic embryogenesis.CO4,L3
OR
(b)Demonstrate the process of Organogenesis in plant tissue culture.CO4,L3
- 13.(a).Explain the steps involved in r DNA Technology.CO5,L2.
OR
(b) Memorize the Agro bacterium mediated gene transfer method.CO5, L4

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Practical Syllabus

SEMESTER-VI

PAPER-II

CREDITS: 01

BOTANY	BOTSEP01	WEF:2023-2024	B.Sc (BZC), AQUA
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Title of the paper: **PLANT TISSUE CULTURE**

NO.OF.HOURS:30

Type of the Course: Skill Enhancement Course (Elective: Practical),

I. Course Outcomes: Students at the successful completion of the course will be able to:

- CO1: Demonstrate the applications of autoclave, laminar air flow, hot air oven.
- CO2: Sterilize the glassware and tools used for tissue culturing.
- CO3: Prepare different stock solutions, media.
- CO4: Measure the growth of callus formed.
- CO5: Demonstrate the hardening and acclimatization in greenhouse.

II: Practical (Laboratory) Syllabus :(30Periods): Atleast 8Practicals....

1. Principles and applications of - Autoclave, Laminar Air flow, Hot Air Oven.
2. Sterilization techniques for glass ware, tools etc.
3. MS medium – Preparation of different stock solutions; media preparation
4. Explants preparation, inoculation and initiation of callus from carrot.
5. Callus formation, growth measure ments.
6. Induction of somatic embryos, preparation of synthetic seeds.
7. Multiplication of callus and organogenesis.
8. Hardening and acclimatization in green house.

III. Lab References:

1. Reinert ,J. and M.M.Yeoman,1982. Plant Cell and Tissue Culture – A Laboratory
2. Manual ,Springer –Verlag Berlin Heidelberg
3. RobertN.TrigianoandDennisJ.Gray,1999. Plant Tissue Culture Concepts and Laboratory Exercises. CRC Press, Florida
4. AshokKumar,2018.PracticalManualforBiotechnology,CollegeofHorticulture&Forestry, Jhalawar, AU, Kota
5. Chawla,H.S.,2003.PlantBiotechnology:APracticalApproach,NovaSciencePublishers,New York
6. Web sources suggested by the teacher concerned.

Practical Question Paper

Time: 3hrs

Max.Marks:50

Time Allowed : 3hours

Max.Marks:40

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- 1.Demonstration of a sterilization technique 'A' 7 M
 - 2.Preparation of MS medium 'B' 8 M
 3. Demonstration of callus culture technique /synthetic seeds 'C' 5M
 4. Scientific observation and data analysis..... ..4 x 3 =12 M
 - D. Tissue culture equipment /photograph
 - E. Morphogenesis or organogenesis - photograph
 - F. Direct gene transfer methods/Secondary metabolite
 - G. Transgenic plant/photograph
 5. Record 5M
 - 6.Vivavoce 3M

Evaluation Scheme	Marks
One Major Experiment (Experiment No :)	15
One Minor Experiment (Experiment No:)	10
Slide Preparation, if any	5
Practical Record + Viva Voce	10
Total	40

**ADUSUMILLIGOPALAKRISHNAIAH&SUGARCANEGROWERSSIDDHARTHADEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P.(AUTONOMOUS).**

NAAC recredited at 'A' level
Autonomous-ISO9001-2015Certified

Title of the Paper: **Mushroom cultivation (7C)**

Semester:-VI

Course Code	BOTSE02	Course Delivery Method	Class Room/Blended Mode - Both
Credits	4	CIA Marks	25
No. of Lecture Hours/Week	3	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
YearofIntroduction:2022-23	Year of Offering 2022-2023	YearofRevision-2023- 24	Percentage of Revision:0%

Course Out comes: Students at the successful completion of the course will be able to:

CO1	Comprehend the value of mushrooms
CO2	Identify the methods of composting and the materials required.
CO3	Acquire a critical knowledge on spawning and casing.
CO4	Demonstrate skills in cultivation of various mushrooms.
CO5	Understand the Post-harvest technology.

Syllabus

Course Details:

Unit	Learning Units	Lecture Hours
I	<p>Mushrooms: Definition, structure of a mushroom and a brief account of life cycle; historical account and scope of mushroom cultivation; difference between edible and poisonous mushrooms.</p> <p>Morphological features of any four edible mushrooms, Button mushroom (<i>Agaricus bisporus</i>), Milky mushroom (<i>Calocybe indica</i>), Oyster mushroom (<i>Pleurotu ssajorcaju</i>) and Paddy straw mushroom (<i>Volvariellavolvacea</i>). Nutritional value of mushrooms; medicinal mushrooms in South India – Ganoderma lucidum, Phellinus rimosus, Pleurotus florida and Pleurotus pulmonaris – their therapeutic value ; Poisonous mushrooms - harmful effects.</p>	12
II	<p>Basic requirements of cultivation system Small village unit and larger commercial unit; lay out of a mushroom farm –location of building plot, design of farm, bulk chamber, composting, equipment and facilities, pasteurization room and growing rooms.</p> <p>Compost and composting: Definition, machinery required for compost making, materials for compost preparation. Methods of composting –long method of composting and short method of composting</p>	12
III	<p>Spawning and casing Spawn and spawning: Definition, facilities required for spawn preparation; preparation of spawn substrate. Preparation of pure culture, media used in raising pure culture; culture maintenance, storage of spawn. Casing: Definition, Importance of casing mixture, Quality parameters of casing soil, different types of casing mixtures, commonly used materials.</p>	12
IV	<p>Mushroom cultivation Raw material, compost, spawning, casing, cropping, and problems in cultivation (diseases, pests and nematodes, weed molds and their management strategies), picking and packing for any Four of the following mushrooms: (a) Button mushroom (b) Oyster mushroom (c) Milky mushroom and (d) Paddy straw mushroom.</p>	12
V	<p>Post harvest technology Shelf life of mushrooms; preservation of mushrooms - freezing, dry freezing, drying and canning. Quality assurance and entrepreneurship - economics of different types of mushrooms; value added products of mushrooms. Management of spent substrates and waste disposal of various mushrooms.</p>	12

References / Text Book/ e-books/websites

1. Tewari Pankaj Kapoor, S.C.(1988). Mushroom Cultivation. Mittal Publication, New Delhi.
2. Pandey R.K,S.K Ghosh,(1996). A Hand Book on Mushroom Cultivation. Emkey Publications
3. Web resources suggested by the teacher concerned and the college librarian including reading material.

Reference Materials on the Web/weblinks:

<https://www.youtube.com/watch?v=DwMCw14khIU>

<https://www.youtube.com/watch?v=vggMIUelsoU>

IV Co – Curricular Activities

(a) Mandatory: (Training of students by teacher in field related skills:(lab:10+field:05)

1. **For Teacher:** Training of students by teacher in the laboratory/field for not less than 15 hours on the field techniques/skills of identification of edible and poisonous mushrooms, basic facilities of a mushroom culture unit, preparation of compost and spawn, cultivation practices of edible mushrooms, storage and marketing of produce.

2. **For Student:** Students shall (individually) visit mushroom culture units in universities/research organizations/private sector write their observations on infrastructure, cultivation practices and products of a mushroom culture unit etc., and submit to the teacher a hand-written Fieldwork/Project work Report not exceeding 10 pages in the given format.

3. Max marks for Field work /ProjectworkReport:05.

6. Suggested Format for Fieldwork/Project work Report: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.

4. Unit tests (IE).

b) Suggested Co – Curricular Activities:

1. Training of students by related industrial experts.

2. Assignments (including technical assignments like identifying various mushrooms, tools and techniques for culture, identification and control of diseases etc.,

3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).

4. Preparation of videos on tools and techniques in mushroom culture.

5. Collection of material /figures /photos related to edible and poisonous mushrooms, cultivation of mushrooms in cottage industries, writing and organizing them in a systematic way in a file.

6. Visits to mushroom culture units in universities, research organizations, private firms, etc.

7. Invitedlecturesandpresentationsonrelatedtopicsbyfield/industrialexerts.

TITLE OF THE PAPER: Mushroom Cultivation

Model Question Paper Structure for SEE

Max.Time:3Hrs.

Course Code: BOTSE02

Max.Marks:75M

Short Answer Questions

SECTION–A

Answer any Five questions.

5x5 =25Marks

Each answer carries 5marks.Atleast1questionshouldbegivenfromeach Unit

1. Extend the medicinal value of Ganoderma.CO2,L2
2. Describe the small village unit.CO2,L1
3. List the facilities required for spawn preparation.CO3,L1
4. Explain weed mold in mushroom cultivation.CO4,L4
5. Illustrate the Novel Value Added Products of Mushrooms.CO5,L3
6. Enumerate the Poisonous mushrooms.CO1,L1
7. Summarize Lay out of a mushroom farm.CO2,L2
8. Explain about the Casing oil.CO3,L4

SECTION B

5x10 =50Marks

Answer all questions. Each answer carries 10marks.Two questions should be given from each unit with internal choice.

9. (a) Describe the life cycle of a mushroom.CO1,L1
OR
9. (b) Describe the morphological features of Paddy straw and oyster mushroom.CO1,L1.
10. (a) Explain various types of composting methods.CO2,L4
OR
10. (b) Point out basic requirements of mushroom cultivation.CO2,L4.
- 11.(a) What is casing ? Explain different types of casing mixture and their Importance.CO3, L4

OR
- 11.(b) Appraise an account of different types of media used for preparation of pure culture.CO3,L4
- 12.(a) Summarize the process of cultivation of Milky mushroom.CO4,L1
OR
12. (b) Extend an account cultivation of Oyster mushroom.CO4,L1
13. (a) Explain the shelf life of mushrooms? What are the conditions required to improve shelf life of mushrooms? CO5,L4

OR
13. (b) Explain how mushrooms are preserved through Freeze drying method.CO5,L4

Practical Syllabus

SEMESTER-V

PAPER- V

CREDITS:01

BOTANY	BOTSEC02	WEF:2023-2024	B.Sc (BZC), AQUA
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MUSHROOM CULTIVATION

Type of the Course: Skill Enhancement Course (Elective: Practical),

I. Course Outcomes: Students at the successful completion of the course will be able to:

CO1: Identify different types of mushroom.

CO2: Demonstrate preparation of pure culture of an edible mushroom.

CO3: Prepare compost and casing mixture.

CO4: Crop and harvest mushrooms.

CO5: Prepare value - added products.

II: Practical (Laboratory) Syllabus :(30Periods):Atleast8Practicals....

1. Identification of different types of mushrooms.
2. Preparation of pure culture of an edible mushroom.
3. Preparation of mother spawn.
4. Production of planting spawn and storage.
5. Preparation of compost and casing mixture.
6. Demonstration of spawning and casing.
7. Hands on experience on cropping and harvesting.
8. Demonstration of storage methods.
9. Preparation of value-added products.

III. Lab References:

1. Sushma Sharma Sapna Thakur Ajar Nath Yadav, 2018. Mushroom Cultivation: A Laboratory Manual, Eternal University, Sirmour, H.P.
2. Kadhila-Muandingi, N.P., F.S. Mubiana and K.L. Haluendo, 2012. Mushroom Cultivation: A Beginners Guide, The University of Namibia
3. Gajendra Jagatap and Utpal Dey, 2012. Mushroom Cultivation: Practical Manual, LAMBERT Academic Publishing, Saarbrücken, Germany
4. Deepak Som, 2021. A Practical Manual on Mushroom Cultivation, P.K. Publishers & Distributors, Delhi
5. Web sources suggested by the teacher concerned.

Question Paper Pattern: Practical

Time: 3 hrs

Max.Marks:50

Time Allowed: Three hours

Max.Marks:40

1. Demonstration of preparing pure culture / mother spawn 'A' 7 M
2. Preparation method for planting spawn and storage/compost and casing material 'B' 8 M
3. Demonstration of spawning and casing/storage and making a value - added product 'C' 5 M
4. Scientific observation and data analysis 4x 3 = 12M
- D. Edible /poisonous mushroom specimen/photograph
- E. Infrastructure /tool used in mushroom cultivation
- F. Material for compost/casing
- G. Storage practice /a value- added product
5. Record 5M
6. Viva Voce 3M

Evaluation Scheme	Marks
One Major Experiment (Experiment No :)	15
One Minor Experiment (Experiment No :)	10
Slide Preparation, if any	5
Practical Record + Viva Voce	10
Total	40

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Value added course
PLANT NURSERY MANAGEMENT

OBJECTIVES:

The main objective of the nursery is to grow plants in an open environment, maintain a good quality of plants and protect the plants from pests and diseases.

METHODOLOGY:

Planning - demand for planting material, provision of mother blocks, requirement of land area, water supply, working tools, growing structures and input availability.

Implementation - land treatment, protection against biotic interference and soil erosion, proper layout, input supply, etc.

Duration:

Value Added Course

Title: PLANT NURSERY

Date : **From** **to**

Date	Content	Module No.
	Introduction to Plant Nursery 1. Plant nursery: definition, importance. 2. Different types of nurseries on the basis of duration, plant parts used for propagation. 3. Basic facilities for a nursery: layout and components of a good nursery.	UNIT-1
	Basic Requirements for Nursery 1. Nursery beds – types and precautions to be taken during preparation. 2. Growing media, nursery tools and implements, containers for plant nursery in brief. 3. Outlines of vegetative propagation techniques to produce planting material. 4. Sowing methods of seeds and planting material.	UNIT-2
	1. Seasonal activities and routine operations in a nursery. 2. Nursery management- watering, weeding and nutrients: pests and diseases. 3. Common possible errors in nursery activities. 4. Economics of nursery development, pricing and record maintenance. Online nursery information and sales systems	UNIT-3
	Practical Syllabus 1. Demonstration of Nursery bed making of propagation media. 2. Demonstration of preparation of media for Nursery. 3. Hands on training on vegetative propagation techniques. 4. Hands on training on sowing methods of seeds and other material. 5. Visit to an agriculture/horticulture/forest nursery. 5. Case study on establishment and success of a plant nursery.	UNIT-4

A.G. & S.G. Siddhartha Degree College of Arts & Science

Vuyyuru-521165, Krishna District, Andhra Pradesh

Value Added Course

Title: PLANT NURSERY

Test Exercise:

- Horticulture is the study that includes
 - Fruits, vegetables and flowers
 - All food crops
 - Vegetable gardens and lawns near hotels only
 - Some bush crops and apples
- Root suckers are
 - Insects that suck nutrients from the roots of plants
 - Shoots that arise from roots to form new plant
 - New plant parts that arise from the branches of fruit trees
 - Roots of neighbouring plants that share water with the another plant
- A variety or strain produced by horticultural or agricultural techniques and not normally found in natural population is called
 - Hybrid
 - Tissue culture
 - GMO
 - Cultivar
- Cryopreservation is a technique used for
 - Crystallization of food
 - Food packing
 - Seed saving
 - Preservation of excess production of vegetables
- In hybridization this is not part of the technique used
 - Transfer pollen
 - Collect pollen
 - Emasculate
 - Use of two plants to bridge the stems together
- Tissue culture is a good technique to
 - Cross two varieties
 - Rapidly increase the size of a trees by strengthening the stem
 - Eliminate virus
 - Improve yield of crops
- The following is not a plant growth regulator
 - Acetic acid
 - Auxins
 - Gibberellins
 - Ethylene
- Mycorrhizae is associated with the following
 - Formation of root nodules
 - Hyphae penetrating the soil
 - Found mostly in lower plants
 - Soil erosion
- The pH in soils can be raised by adding
 - Sand
 - lime
 - sulphur
 - nitrogen
- In cold places frost damage can be reduced in horticultural crops using these methods except
 - Overhead sprinklers at night
 - Green houses and shade nets
 - Wind breaks placement
 - Appropriate fungicide application
- For seed treatment _____ is a suitable fungicide.

- (a) carbandzim (b) monocrotophos (c) copper (d) zinc
12. The soil for a nursery should preferably be _____.
- (a) Clayey (b) sandy (c) sandy loam (d) black
13. The nursery must be free from _____.
- (a) water logging (b) organic matter (c) fertiliser (d) irrigation water
14. A _____ type of nursery protects seedlings from extreme weather conditions.
- (a) Thatched roof (b) shade-net (c) poly-tunnel (d) None of the above
15. The type of nursery bed prepared during the rainy season is _____.
- (a) sunken (b) raised (c) flat (d) furrow
16. The soil that must be used as growing medium is _____.
- (a) clayey (b) sandy loam (c) red soil (d) acidic
17. Sphagnum moss is commercially used as a rooting medium in _____.
- (a) air layering (b) budding (c) grafting (d) cutting
18. Organic compound, which promotes or inhibits the growth of the plant, is known as _____.
- (a) PGR (b) nitrogen (c) boron (d) vermin compost
19. High value annual seeds are, generally, sown _____.
- (a) by broadcasting (b) in line sowing (c) in pro-trays (d) in pots
20. The common growing medium in plug-trays is _____.
- (a) coco peat (b) sand (c) vermiculite (d) soil
21. Removal of plants from pots for planting is called _____.
- (a) Re-potting (b) de-potting (c) potting (d) None of the above
22. Irrigation water is known as _____.
- (a) surface application (b) sub-surface application (c) fertigation (d) top dressing
23. _____ is the most common disease in a nursery.
- (a) Powdery mildew (b) Damping-off (c) Leaf spot (d) Blight
24. Which among the given cities is known as Garden city?
- (a) Bangalore (b) Delhi (c) Pune (d) Chennai
25. Chip budding is done in
- (a) Rose (b) Grapes (c) Hibiscus (d) Rubber

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Value Added Course

Title: PLANT NURSERY

Key:

- 1 a) Fruits, vegetables and flowers
- 2 b) Shoots that arise from roots to form new plant
- 3 d) Cultivar
- 4 c) Seed saving
5. d) Use of two plants to bridge the stems together
- 6 c) Eliminate viruses
- 7 a) Acetic acid
- 8 a) Formation of root nodules
- 9 .b) lime
- 10 b) Green houses and shade nets
- 11 (a) carbendazim
- 12 c) sandy loam
- 13(d) irrigation water
- 14(c) poly-tunnel
- 15(b) raised
- 16 (a) clayey
- 17(a) air layering
- 18 (a) PGR
- 19(b) in line sowing
- 20(a) coco peat
- 21(a) Re-potting
- 22.(c) fertigation
- 23(b) Damping-off
- 24(a) Bangalore
- 25 (a) Rose