ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGEOFARTS&SCIENCE, VUYYURU-521165, Krishna, A.P.(AUTONOMOUS).

NAAC reaccredited at 'A 'level

Autonomous–ISO9001-2015Certified

DEPARTMENT OF BOTANY

BOS MEETING 14 – 02 - 2025

ACADEMIC YEAR - (2024 -25)

EVEN SEM – II & IV

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).
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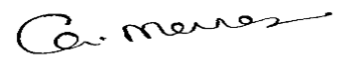
DEPARTMENT OF BOTANY
BOARD OF STUDIES MEETING: **14th February 2025**

The Board of studies meeting of Department of Botany was convened at 2:00 pm on **14 /02/2025** 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 2024-2025, during the II & IV semester for the academic year 2024-2025 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	
2	**Prof. Avasan Maruthi** Bio Sciences & Bio technology Krishna University Machilipatnam.	University Nominee	
3.	**Sri Dr. D.Simon** Lecturer in Botany St.Anns College for Women,Gorantla Guntur.	Subject Expert	
4.	**Ch. Merena** Lecturer in Botany Hindu College. Guntur.	Subject Expert	
5.	**Sri. G. Narendra** Managing Director, Shree Icon Pharmaceutical Laboratories, Sales & Service, Vijayawada.	Industrialist	
6.	**Sri. N. Ramana Rao** Lecturer in Botany, A.G &S.G.S Degree College Vuyyuru.	Member	
7	V. Thanusri dattha sudha (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 2024 -2025.

2. To recommend the Model Question paper, Blue Print and Guidelines for Question paper setters for Fourth Semester of **II B.Sc. Botany Major of B.Sc. Honours (major -9, majaor -10 & majaor -11)** for the academic year 2024 –2025.

3. To introduce Value Added Course (Non-Credits) on Plant Nursery for II Semester of I B.Sc. Botany for the academic year 2024 - 2025.
4. Internship Programme for VI Semester of III B.Sc.

5. To recommend the teaching and evaluation methods to be followed under Autonomous status.

6 .Any other matter.

CH. Beulah Ranjani

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 2024-2025 without any changes. Major -3(Non-vascular Plants) & paper 4 (Origin of Life and Diversity of Microbes).

2. It is resolved to implement the syllabi prescribed by APSCHE for Fourth Semester of I**I B.Sc. Botany Major of** B.Sc**. Honors for** the academic year 2024-2025 without any changes. Major – 9 (Anatomy and Embryology of Angiosperms), Major – 10 (Plant Ecology, Biodiversity and Phyto geography) & Major – 11 (Plant Resources and Utilization).

3. It is resolved to implement semester end Internship Programe for III B.Sc B.Z.C & ABC in VI Semester.

4. It is resolved to introduce Value Added Course (Non-Credits) on Plant Nursery for II Semester of I B.Sc -Botany for the academic year 2024- 2025.

5. It is resolved to implement the following Teaching and Evaluation methods to be followed under Autonomous status.

Evaluation procedure:

Internal Assessment Examination:

- Out of maximum100 marks in each paper for I B.Sc. **Botany** Major of B.Sc. Honours 30marks 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 maximum100 marks in each paper for IV Semester of II B.Sc, BZC &ABC 30marks 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 reaming 5 marks seminar for IV semester. There is no pass minimum for internal assessment for IV 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".

CH. Beulah Ranjani

Chairman

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

COURSESTRUCTURE – 2024 – 2025

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)	4	30	70	3	Core
	23BOMAP121	Practical	2	15	35	1	Lab
II	**23BOMAL122**	Origin of Life and Diversity of Microbes –(T)	4	30	70	3	Core
	23BOMAP121	Practical	2	15	35	1	Lab
IV	**23BOMAL241**	Anatomy and Embryology of Angiosperms	4	30	70	3	Core
		Practical	2	10	40	1	Lab
	23BOMAL242	Plant Ecology, Biodiversity and Phyto geography	4	30	70	3	Core
		Practical	2	10	40	1	Lab
	23BOMAL243	Plant Resources and Utilization	4	30	70	3	Core
		Practical	2	10	40	1	Lab
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 ofnon-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	**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.	9
II	**Unit2: Biology of selected Algae** Occurrence, structure, reproduction and life cycle of: (a) Chlorophyceae: *Spirogyra* (b) Phaeophyceae: *Ectocarpus* (c) Xanthophyceae: *Vaucheria* (d) Rhodophyceae:*Polysiphonia* A brief account of Bacillariophyceae Culture and cultivation of *Chlorella.*	9
III	**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.	9
IV	**Biology of selected Fungi** Occurrence, structure, reproduction and life cycle of: (a) Mastigomycotina: *Phytophthora* (b) Zygomycotina: *Rhizopus* (c) Ascomycotina: *Penicillium* (d) Basidiomycotina: *Puccinia* Occurrence, structure and reproduction of lichens; ecological and economic importance oflichens.	9
V	**Biology of Bryophytes** General characteristics of Bryophytes; Rothmaler (1951) classification. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) andlife cycle of (a) Hepaticopsida: *Marchantia* (b) Anthoceratopsida: *Anthoceros* (c) Bryopsida: *Funaria* General account on evolution of sporophytes in Bryophyta.	9

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, NewCentral 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., NewJersey
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 toPhycology. 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 AgeInternational 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 UniversityPress, New York.
9. Shaw, A.J.& B.Goffinet (2000) Bryophyte Biology .Cambridge University Press, NewYork.

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 ofany 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 thefungal genera and lichen forms in the syllabus**.**
Evaluation method: Conducting a Quiz or an exam/ evaluating the chart or drawings orconcise 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 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 reproductiveorgans.
2. Decipher the lichens and Bryophytes based on morphological, anatomical andreproductive features.

II. Laboratory/field exercises:

Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structuresof 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 fruiticose
7. **Bryophyta:** *Marchantia, Anthoceros* and *Funaria.*

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I SEMESTERENDEXAMINATIONS

PAPER–III **MODELPAPER** **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) Aplano spores in vaucheria 4M

OR

(b) Cystocarp

3. (a) Hetero thalism and homothallism 4M

OR

(b) Fertilization,

4. (a)genetic code 4M

OR

(b) Cell theory

5. (a) Persistent Apices 4M

OR

(b) T.S of gemme 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 oflichens.

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 2024-2025	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 groupsof 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	**Origin of life and Viruses** Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Discovery ofmicroorganisms, Pasteur experiments, germ theory of diseases. Five kingdom classification of R.H. Whittaker Shape and symmetry of viruses; structure of TMV and Gemini virus. Multiplication of TMV; A brief account of prions, viroids and virusoids; Transmission ofplant viruses and their control. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.	9
II	**Special groups of Bacteria** General characteristics, outline classification and economic importance of followingspecial groups of bacteria: a) Archaebacteria b) Chlamydiae c) Actinomycetes d) Mycoplasma e) Phytoplasma f) Cyanobacteria Culture and cultivation of *Spirulina*	9
III	**Eubacteria:** Occurrence, distribution and cell structure of eubacteria. Classification of Eubacteria based on nutrition. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction). Economic importance of Eu-bacteria with reference to their role in Agriculture and industry (fermentation and medicine).	9
IV	Soil microbes – interactions Distribution of soil microorganisms in soil. Factors influencing the soil micro flora - Role of microorganisms in soil fertility. Interactions among microorganisms, mutualism, commensalism, competition, Amensalism,parasitism, predation. Microorganisms of Rhizosphere, Phyllosphere and Spermophere; microbial interactions andtheir effect on plant growth.	9
V	**Microbes in agriculture** Mass production, mode of applications, advantages and limitations of bacterial Inoculants (*Rhizobium*, *Azotobacter*, *Azospirillum*, Cyanobacteria). Role of Frankia and VAM in soil fertility. Microbial Biopesticides: mode of action, factors influencing, target pests; Microbialherbicides.	9

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. Presscott, L. Harley, J. and Klein, D. (2005) Microbiology, Tata McGraw –Hill Co. NewDelhi.
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 nativ 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.

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II SEMESTEREND EXAMINATIONS

PAPER–IV **MODELPAPER** **Course Code:** 23BOMAL122

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) Archaebacteria. 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 andindustry.

4. (a) Role of microorganisms in soil fertility?

OR

(b)Write an essay on microbial interactions andtheir effect on plant growth?

5. (a)Write about advantages and limitations of bacterial inoculants.

OR

(b) Give an account on Microbial biopesticides.

Semester - II

23BOMAL122 Credits -1

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 inthe 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 Archaebacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.

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Title of the Paper: **Anatomy and Embryology of Angiosperms**

Semester: IV Credits: 3

Course Code	**23BOMAL241**	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 :2021-22	Year of Offering: 2024 - 25	Year of Revision: --	Percentage of Revision: -

Course Pre requisites: Knowledge of Anatomy and Embryology of Angiosperms at +2 level.

Course Description:

An over view of the course content and objectives.

This course provides an in-depth exploration of the structure, development, and reproduction of angiosperms, the most diverse and ecologically significant group of plants. Topics include the anatomy of vegetative and reproductive organs, the structural and functional adaptations of tissues, and the cellular and molecular processes underlying plant growth and development.

The embryology section examines the lifecycle of angiosperms, focusing on gametogenesis, fertilization, embryo development, and seed formation. Special emphasis is given to evolutionary trends, comparative embryology, and the practical applications of embryological knowledge in fields such as agriculture, biotechnology, and conservation.

Through lectures, laboratory work, and research projects, students will gain hands-on experience in microscopic techniques, specimen preparation, and data analysis, enabling them to understand and interpret the structural and developmental complexity of angiosperms.

Course Aims and Objectives:

CO1	To know about various types of tissues in plants and their organization.
CO2:	To obtain awareness on anomalous secondary growth in plants and economic value of woods.
CO3	To acquire knowledge on development of male and female gametophytes in plants.
CO4:	To probe in to embryogenesis in angiosperms.
CO5	Integrate Concepts of Plant Reproductive Biology **.**

Course Outcomes

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Categorize various tissues and evaluate their role in plants.	**K4**	**5**	**1**
CO2	Explain anomalous secondary growth in some plants and justify the value of timber plants.	**K5**	**5**	**1**
CO3	Summarize the events in micro-sporogenesis and development of male gametophyte.	**K2**	**5**	**1**
CO4	Discuss the events in mega-sporogenesis and development of female gametophyte.	**K2**	**5**	**1**
CO5	Propose the incidents in embryo genesis of anangio spermic plant species.	**K6**	**5**	**1**

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					**2**			**3**	
CO2					**3**			**3**	
CO3					**1**			**3**	
CO4					**1**			**3**	
CO5					**3**			**3**	

Syllabus

Course Details:

Unit	Learning Units	Lecture Hours
I	**Tissues in plants** 1. Meristematic tissues: Definition, classification, structure and functions. 2. Apical meristems: Generalised structure of shoot apex, theories on organization of Shoot Apical Meristem (SAM) - Apical cell theory, Tunica-Corpus theory and Histogen theory. 3. Permanent tissues (simple and complex). 4. A brief account of plant secretary tissues/cells. **Exercises/Projects:** Microscopicobservationsondifferenttissuesinplantsandrecordingcharacteristics. **Specific Resources: (web)** **https://youtu.be/K4zGLHZj5k8**	9
II	**Anomalous growth in plants** 1. Tissue systems –Epidermal, ground and vascular. 2.Anomalous secondary growth in root of *Beta vulgaris* 3. Anomalous secondary growth in stems of *Boerhaavia* and Dracaena. 4. Study of timbers of economic importance -Teak, Red-sanders and Rosewood. 5. Applications of anatomy in plant systematics forensics and pharma cognosy. **Exercises/Projects:** Visit to timber depots and furniture shops and making are porton various woods. **Specific Resources: (web)** **https://youtu.be/-PY77hWVVXE**	9
III	**Anther and pollen** 1. Structure and functions of anther wall, micro-sporogenesis, callose deposition and its significance. 2. Pollen wall structure, MGU (male germ unit) structure, NPC system; a brief account of Palynology and its scope; development of male gametophyte. 3. Pollen wall proteins; Pollen viability, storage and germination; Abnormal features: pseudomonads, polyads, massulae, pollinia. **Exercises/Projects:** Study of pollen structure, germination and viability in some local plantspecies. **Specific Resources: (web)** **https://youtu.be/i4WB7_ATaDo**	9
IV	**Ovules, fertilization and endosperm** 1. Structure and types of ovules, mega sporogenesis; monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*) types of embryo sacs. 2. Outlines of pollination; self-incompatibility-basic concepts; methods to overcome self-incompatibility (mixed pollination, bud pollination, stub pollination). 3. Double fertilization in angiosperms –process and consequences. 4. Perisperm; endosperm – types (free nuclear, cellular, helobial and ruminate) and biological importance. **Exercises/Projects:** Group discussion /quiz on endospermt ypes and functions. **Specific Resources: (web)** **https://youtu.be/-u5_Mm5vd1c**	9
V	**Embryogeny and seeds** 1.Embryogeny in dicot (*Capsellabursa - pastoris*) 2. Embryogeny in monocot (*Sagittaria sagittifolia*). 3. Seed structure in monocot and dicot. 4. Importance of seed and seed dispersal mechanisms. 5. Poly embryony and apomixes: Introduction, classification, causes and applications. **Exercises/Projects:** Drawings of embryogeny in some angiosperms and making comparative report. **Specific Resources: (web)** **https://youtu.be/fkJaevnES18**	9

Text Books:

1. Pandey,B.P.(2013)CollegeBotany,Volumes-II&III,S.ChandPublishing,NewDelhi
2. Bhattacharya,K.,G.Hait&Ghosh,A.K.,(2011)ATextBookofBotany,Volume-II,NewCentralBook Agency Pvt. Ltd., Kolkata

References:

1. Esau, K.(1971)Anatomy of Seed Plants. JohnWiley and Son, USA.
2. Fahn, A. (1990) Plant Anatomy, Pergamon Press, Oxford.
3. Cutler, D.F., T. Botha & D.Wm. Stevenson (2008). Plant Anatomy: An Applied Approach, Wiley, USA
4. Paula Udall(1987)Anatomy of Flowering Plants: An Introduction to Structure and Development. Cambridge University Press, London
5. Bhojwani, S. S. and S. P. Bhatnagar (2000) The Embryology of Angiosperms (4^{th} Ed.), Vikas Publishing House, Delhi.
6. Pandey, A. K. (2000) Introduction to Embryology of Angiosperms. CBS Publishers & Distributors Pvt. Ltd., New Delhi
7. Maheswari, P.(1971)An Introduction to Embryology of Angiosperms. Mc Graw Hill Book Co., London. Johri, B .M.(2011) Embryology of Angiosperms. Springer- Verlag, Berlin.

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Model Question Paper

Time: 3 hrs **Max.marks:70**

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Section A

Short Answer Questions (20 Marks)
Answer All questions. Each question carries 4 Marks. **5X4= 20M**

Q1 (a) Explain about meristem classification.K2
(OR)
(b) Summarize a note on xylem.K2

Q2 (a) Summarize a note on structure of stomata.K2
(OR)
(b) Illustrate the economic importance of Teak wood. K2

Q3 (a) Explain about Pollen wall structure.K2
(OR)
(b) What is NPC System? Explain. K2

Q4 (a) Extend a note on types of ovules. K2
(OR)
(b) Outline the types of pollination. K2

Q5 (a) Explain about importance of seed dispersal mechanism.K2
(OR)
(b) Explain apomixes.K2

Section B

Long Answer Questions (50 Marks)
Answer All questions. Each question carries 10 Marks. **5X10=50M**

Q6 (a) Conclusion of theories on organization of shoot apical meristems. K4
OR
(b)Classify the simple tissues. K4

Q7 (a) Explain about epidermal tissue systems. K2
OR
(b)Explain about anomalous secondary growth in Boerhaavia. K2

Q8 (a) Explain about micro sporogenesis. K2
OR
(b)Extend on development of male gametophyte. K2

Q9 (a) Explain about mega sporogenesis. K2
OR
(b)Explain double fertilization in angiosperms. K2

Q10(a) Extend on embryogeny in dicot.K2
OR
(b)Extend on polyembryony.K2

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Practical Syllabus

Title of the Paper: **Anatomy and Embryology of Angiosperms**

Semester: IV Credits: 1

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Course Description:

This course provides an in-depth exploration of plant anatomy and reproductive biology, focusing on the structural and developmental aspects of dicot and monocot plants. Through laboratory observations, dissections, and studies of permanent slides and photographs, students will gain a comprehensive understanding of key topics such as meristematic tissues, tissue organization in shoot apices, and anomalies in secondary growth.

Special emphasis is placed on reproductive structures, including the study of anthers, ovules, pollen germination, and pollen viability. The course also delves into the intricate processes of embryogenesis in dicots and monocots, alongside the structure and function of endosperm and haustorial systems.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	**To observe and differentiate the meristematic tissues** in dicot and monocot plants, understanding their structure, organization, and role in growth.
2	**To study tissue organization** in shoot apices using permanent slides, identifying distinct zones and layers involved in the formation of shoot tissues.
3	**To analyze anomalous secondary growth** in the roots of *Beta vulgaris*, understanding the unique patterns of cambial activity and tissue development.
4	**To examine anomalous secondary growth** in the stems of *Boerhaavia* and *Dracaena*, exploring deviations from typical secondary growth patterns in plants.
5	**To investigate pollen germination and viability**, evaluating the conditions necessary for germination and assessing pollen fertility.

Course Outcomes

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	**Apply an understanding of meristematic tissues** in dicot and monocot plants, distinguishing their structure, organization, and functional roles in plant growth.	K3	5	1
CO2	**Identify and describe tissue organization** in the shoot apices of plants using permanent slides, including zones of division, elongation, and differentiation.	K3	5	1
CO3	**Analyze anomalous secondary growth** in the roots of *Beta vulgaris* and explain the formation of additional cambial rings and their contribution to root thickening.	K4	5	1
CO4	**Examine and interpret anomalous secondary growth** in the stems of *Boerhaavia* and *Dracaena*, understanding their atypical cambial activity and tissue arrangement.	K4	5	1
CO5	**Dissect the structure and organization of reproductive tissues,** including the anther and ovule, using permanent slides or photographs.	K4	5	1

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					**1**			**3**	
CO2					**1**			**3**	
CO3					**2**			**3**	
CO4					**2**			**3**	
CO5					**2**			**3**	

Course Structure:

This lab list covers the key areas of an Anatomy and Embryology of Angiosperms course, providing Hands - on practice with microscopic observations.

Lab 1	Observation of Meristems in dicot plant. **Dataset** (web link) / **Experiment**: https://youtu.be/jdBmE18aZFk **Tasks:** Collection of apical tips of roots and shoots where Meristematic activity occurs.
Lab 2	Observation of Meristems in monocot plant. **Dataset** (web link)/**Experiment**: https://www.youtube.com/shorts/poh27NdCjB4?feature=share **Tasks:** Obtaining the root or shoot tips where meristematic cells are actively dividing
Lab 3	Tissue organization in shoot apices using permanent slides. 1. L.S of shoot apex: Outline showing major regions. 2. L.S of shoot apex: Cellular details. **Dataset** (web link) / **Experiment**: https://youtu.be/03K82iPyWS0 **Tasks:** Sketch detailed diagrams of the observed shoot apex structure, labeling all key regions and zones.
Lab 4	**Study and Observation of** anomalous secondary growth in root of *Beta vulgaris* **Dataset**(weblink)/**Experiment**: https://youtu.be/kAt5EiC1U7U **Tasks:** Create detailed, labeled diagrams of the transverse section, emphasizing the anomalous features.
Lab 5	**Study and Observation of** anomalous secondary growth in stem of *Boerhaavia.* **Dataset**(weblink)/**Experiment**. https://youtu.be/f9LbvwoUG54 **Tasks:** Preparation of Transverse Sections.
Lab 6	**Study and Observation of** anomalous secondary growth in stem of *Dracaena.* **Dataset** (web link) / **Experiment**: https://youtu.be/lOeAHK5w5qY **Tasks:** Preparation of Transverse Sections
Lab 7	Study of anther using permanent slides/photographs **Dataset** (weblink)/**Experiment**: **https://youtu.be/0TXTlYRs128** **Tasks:** Study the stages of anther development from young to mature, understanding Processes like sporogenesis and the formation of microspores.
Lab 8	Study of ovules using permanent slides/photographs **Dataset** (web link) / **Experiment**: https://www.youtube.com/shorts/Z0-puU4MejE?feature=share **Tasks:** Compare ovules from different plant species in terms of size, shape, and

	structural organization.
Lab 9	Study and observation of pollen germination. **Dataset** (web link) / **Experiment**: https://youtu.be/Gj1KNZE-t-A **Tasks:** Count the number of germinated pollen grain.
Lab 10	Study and observation of pollen viability. **Dataset** (web link) / **Experiment**: **https://youtu.be/Rzdpa4U-SMI** **Tasks:** Examine the impact of factors such as temperature, humidity, and storage conditions on pollen viability.
Lab 11	Dissection and observation of embryosac haustoria in *Santalum.* **Dataset** (web link) / **Experiment**: https://youtu.be/K86XXQdwlB4 **Tasks:** Compare the haustoria of *Santalum* with those of other parasitic plants
Lab 12	**Study of** structure of nuclear endosperm using permanent slides/photographs **Dataset** (web link) / **Experiment**: https://youtu.be/K86XXQdwlB4 **Tasks:** Compare nuclear endosperm with other types of endosperm.
Lab 13	**Study of** structure of cellular endosperm using permanent slides/photographs. **Dataet** (web link) / **Experiment** https://youtu.be/K86XXQdwlB4 **Tasks:** Explain the role of the cellular endosperm in storing nutrients such as starch, proteins, and lipids for the developing embryo.
Lab 14	Dissection and observation of Endosperm haustoria in *Crotalaria.* **Dataset** (web link) / **Experiment**: https://youtu.be/KqLR3mcD3QA **Tasks:** Explain the physiological role of haustoria in nutrient uptake during seed germination.
Lab 15	**Study of** developmental stages of dicot embryos using permanent slides /photographs. **Dataset** (web link) / **Experiment**: https://www.youtube.com/shorts/s8e30jG6MNQ?feature=share **Tasks:** Learn the stages of dicot embryo development.
Lab 16	**Study of** developmental stages of monocot embryos using permanent slides /photographs. **Dataset** (web link) / **Experiment**: https://youtu.be/drqC9JQTO_w **Tasks:** Understand the sequence of monocot embryogenesis.

Semester End Lab Examination

Course Code: 23BOMAP241 **Semester: IV**

Max. Time: 3Hrs. **Max. Marks: 35**

I. Answer the following.

Q1. Take T.S. of the material '**A**', make a temporary slide and justify the identification with specific reasons…**……..8M**

Q2. Take T.S. of the material '**B**', make a temporary slide and justify the identification with specific reasons…**……..8M**

Q3. Write the procedure for the experiment 'C' (Embryology) and demonstrate the same.**8M**

Q4. Identify the following with specific reasons……**3X2=6M**

D. Anatomy

E. Embryology

F. Embryology

II Viva **3 Marks**

III Record **2 Marks**

Internals:15M

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

Title of the Paper: **Plant Ecology, Biodiversity and Phytogeography**

Course Code	**23BOMAL242**	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 :2021-22	Year of Offering: 2024 - 25	Year of Revision: --	Percentage of Revision: -

Course Description:

This course explores the intricate relationships between plants and their environments, the diversity of plant life, and the geographical distribution of vegetation across the globe. Emphasizing ecological principles, it examines the role of plants in ecosystems, their responses to environmental factors, and the dynamics of plant populations and communities.

The biodiversity section focuses on the classification, conservation, and ecological importance of plant species, addressing global and regional challenges such as habitat loss, climate change, and invasive species. The phyto geography component investigates the patterns and processes that determine plant distribution, including historical, climatic, and bio geographical factors.

Students will engage in field studies, data analysis, and research projects to develop a comprehensive understanding of plant ecology and the factors shaping biodiversity and phyto geographical patterns. This hands-on approach is complemented by discussions on current issues in conservation and sustainable management of plant resources.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To figure –out the components of ecosystem and energy flow among different trophic levels.
2	To apprise the characteristics of autecology and synecology.
3	To understand the climatic change and associated impacts on biotic components.
4	To discern the value of biodiversity, threats and conservation strategies.
5	To know the distribution of various plant groups in different geographical areas.

Course Outcomes

At the end of the course, the student will be able to…

CO.no	COURSE OUTCOME	BTL	PO	PSO
CO1	Explain the interactions among the biotic and abiotic components in an ecosystem.	**K5**	**5**	**1**
CO2	Summarize the characteristics of a population and a community.	**K2**	**5**	**1**
CO3	Discuss the environmental problems arising due to climate change.	**K6**	**5**	**2**
CO4	Assess the value of biodiversity and choose appropriate conservation strategy.	**K5**	**5**	**2**
CO5	Make a survey on the distribution of various plant groups in a specified geographical area.	**K6**	**5**	**1**

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					**3**			**3**	
CO2					**1**			**3**	
CO3					**3**				**3**
CO4					**3**				**3**
CO5					**3**			**3**	

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Basic concepts in ecology** 1. Ecology: definition, branches and significance; relation with other sciences. 2. Structure and functions of ecosystems-a biotic and biotic components; flow of energy. 3. Cycling of materials: water, carbon, nitrogen and phosphorus; trophic pyramids, food chains and food webs. 4. Plant sand environment: Climatic (light and temperature) and edaphic. 5. Interactions among plants; interactions between plants and animals. **Exercises/Projects:** Fieldvisittolocalecosystemsandmakingareportonbioticandabioticcomponentsand theirinteractions. **Specific Resources: (web)** **https://youtu.be/GxBFHrhl4HQ**	9
II	**Population and community ecology** Population ecology: definition, characteristics- Natality, Mortality, and Growth curves, ecotypes, Ecads. Community ecology: characteristics-frequency, density, cover, lifeforms, competition, biological spectrum. Ecological succession: Hydrosere and Xerosere. Concepts of productivity: GPP,NPP and Community Respiration Secondary production, P/R ratio and Ecosystems **Exercises/Projects:** Casestudiesonpopulationandcommunityecologiesandmakingacomprehensive report **Specific Resources: (web)** **https://www.slideshare.net/SankritaShankarGaonk/population-ecology-250682969.**	9
III	**Climate Change - Impacts** Soil degradation – causes, consequences and management strategies. Deforestation, forest fires – causes, consequences and management strategies. Global warming, ozone layer depletion, acid rains, ocean acidification – causes and effects. Carbon footprints and carbon credits; The Montreal and the Kyoto protocol. Plant indicators and their role in environmental monitoring. **Exercises/Projects:** Case studies on global and local climatic changes and their impacts, preparing a comprehensive report. **Specific Resources: (web)** **https://youtu.be/IgNm8KwvwC4**	9
IV	**Concepts of Biodiversity** Biodiversity: Basic concepts, Convention on Biodiversity - EarthSummit. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity. Biodiversity Hotspots in India: North Eastern Himalayas and Western Ghats. Principles of conservation: IUCN threat - categories, RED data book. Role of NBPGR and NBA in the conservation of Biodiversity. **Exercises/Projects:** Makingasurveyintheirlocalitytoidentifyendangeredandthreateningspecies. **Specific Resources: (web)** **https://youtu.be/ewJlmPSV_XE**	9
V	**Phytogeography** Principles of Phyto geography, Distribution (wides, endemic, discontinuous species). Endemism–types and causes. . Phytogeographic regions of World. Phytogeographic regions of India. Vegetation types in Andhra Pradesh. **Exercises/Projects:** Collection of data on flora of their locality and preparing a project report. **Specific Resources: (web)** **ttps://youtu.be/nmVOZx-SUyc?list=PL3iTl9IGUE7EbE66anA7i7yyppEOucy4Y**	9

Text Books:

1. Pandey, B.P.(2013)CollegeBotany,Volumes-II&III,S.ChandPublishing,NewDelhi
2. Bhattacharya,K.,G.Hait&Ghosh,A.K.,(2011)ATextBookofBotany,VolumeII,NewCentralBook Agency Pvt. Ltd., Kolkata
3. N.S. Subrah manyam & A.V.S.S. Sambamurty (2008) Ecology Narosa Publishing House, NewDelhi

a. Sharma, P.D.(2012)EcologyandEnvironment.RastogiPublications,Meerut,India.

b.U.Kumar (2007) Biodiversity: Principles&Conservation, Agrobios (India), Jodhpur

c. Mani, M.S (1974) Ecology & Biogeography of India Dr. W. Junk Publishers, The Hague

References:

1. Kormondy, Edward J. (1996) Concepts of Ecology, Prentice-Hall of India Private Limited, New Delhi
2. Begon,M.,J.L.Harper&C.R.Townsend(2003)Ecology,BlackwellScienceLtd., U.S.A.
3. Eugene P.Odum (1996) Fundamentals of Ecology, Natraj Publishers, Dehradun
4. Kumar,H.D.(1992) Modern Concepts of Ecology(7thEdn.,)Vikas PublishingCo.,NewDelhi.
5. Newman, E.I. (2000): Applied Ecology Blackwell Scientific Publisher, U.K.
6. Chapman, J.L&M.J. Reiss (1992): Ecology - Principles & Applications. Cambridge University Press, U.K.
7. Kumar H.D.(2000)Biodiversity &Sustainable Conservation Oxford & IBH Publishing Co Ltd. New Delhi.
8. Cain, S.A. (1944) Foundations of Plant Geography Harper &Brothers, N.Y.
9. Good,R.(1997)TheGeographyofFloweringPlants(2ndEdn.)Longmans, Green&Co.,Inc., London& Allied Science Publishers, New Delhi.

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IV- SEMESTEREND EXAMINATIONS

PAPER – 10 **MODELPAPER** **Course Code: 23BOMAL242**

Title of the paper: Plant Ecology, Biodiversity and Phytogeography
Time: 3Hours **Max.Marks:70**

Section A

Short Answer Questions (20 Marks)
Answer All questions. Each question carries 4 Marks. **5X4=20M**

Q1. (a)Summarize a note on soil profile. K2
OR
(b)Summarize a note on mutualism. K2

Q2. (a) Illustrate mortality. K2
OR
(b)What is GPP? Explain. K2

Q3. (a) Extend global warming. K2
OR
(b)Extend carbon foot print. K2

Q4 (a) Summarize on levels of biodiversity. K2
OR
(b)Summarize on red data book. K2

Q5 (a) Explain endemism. K2
OR
(b)Explain vegetation types in A.P. K2

Section - B

Long Answer Questions (50 Marks) **5X10=50M**
Answer All questions. Each question carries 10 Marks.

Q6.(a) Explain about Structure and functions of ecosystem. K5
OR
(b)Explain nitrogen cycle. K5

Q7.(a) Explain about characteristics of community ecology.K5
OR
(b)Explain essay on hydrosere. K5

Q8.(a) Explain about causes, consequences and management deforestation. K5
OR
(b)Explain the causes, consequences and management of soil degradation. K5

Q9.(a) Simplify biodiversity conservation methods. K4
OR
(b)Categorize biodiversity hot spots in India. K4

Q10.(a) Conclude a note on phytogeographic regions of world. K5
OR
(b)Conclude a note on phytogeographic regions of India. K5

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: **Plant Ecology, Biodiversity and Phytogeography**

Semester: IV Code: **23BOMAP242**

Credits: 01

Max.Time: 3 Hours **PRACTICAL PAPER**

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Course Description:

This course provides a comprehensive introduction to the practical techniques and methodologies used in ecological and environmental science research. Students will gain hands-on experience with essential tools for measuring microclimatic variables, conducting vegetation analyses, and understanding plant adaptations to diverse environments.

Through fieldwork and laboratory studies, participants will explore the biodiversity and phytogeo graphical patterns of the world and India. The course emphasizes the integration of quantitative and qualitative methods to assess ecological diversity, frequency distribution, and abundance of vegetation. Students will also learn to map and identify biodiversity hotspots and analyze ecological adaptations in plants.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	Identify and describe the morphological and anatomical adaptations of hydrophytes and xerophytes to their respective environments.
2	Apply quantitative methods to calculate frequency, density, and abundance of herbaceous vegetation.
3	Identify, locate, and map global and Indian biodiversity hotspots to understand their ecological significance.
4	Develop the ability to synthesize ecological data, draw meaningful conclusions, and present findings effectively.
5	Map and analyze the distribution of plants across phyto geographical regions of the world and India.

Course Outcomes

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Distinguish hydrophytic and xerophytic plants, explaining their morphological and anatomical adaptations to aquatic and arid environments.	**K4**	**5**	**1**
CO2	Record and analyze data collected from meteorological stations, demonstrating an understanding of climate-monitoring methodologies.	**K4**	**5**	**1**
CO3	Select plant populations and compare results to Raunkiaer's distribution models to understand ecological patterns.	**K5**	**5**	**1**
CO4	Develop proficiency in using tools like soil thermometers, anemometers, rain gauges, and lux meters to measure environmental parameters accurately.	**K6**	**5**	**1**
CO5	Propose ecological findings effectively through written summaries, data visualizations, and maps, preparing for further research or professional roles in environmental science.	**K6**	**5**	**1**

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					**1**			**3**	
CO2					**1**			**3**	
CO3					**2**			**3**	
CO4					**3**			**3**	
CO5					**3**			**3**	

Course Structure

This lab list covers the key areas of a Plant Ecology, Biodiversity and Phyto geography course, providing hands-on practice with microscopic observations.

S.NO	SYLLABUS
Lab 1:	Study of instruments used to measure micro climatic variables; a. Soil thermometer, b. Maximum and minimum thermometer, c. Anemometer, d. Rain gauze e. Lux meter. **Dataset** (web link) / **Experiment**: https://youtu.be/o-uLcFIWpHU https://youtu.be/Dh54RPPiaWo https://www.youtube.com/shorts/zBOGvpahYRQ?feature=share https://youtu.be/IISgqY7wwNI https://youtu.be/T8vvu2unNpQ **Tasks:** Compare soil temperature variations during morning, noon, and evening. Analyze the daily temperature range and identify any trends or patterns. Set up the anemometer in an open area and record wind speed readings every hour for a day. Record daily precipitation levels during a week of expected rainfall. Compare the light intensity levels in shaded versus un shaded areas within the same environment.
Lab 2	Study of morphological adaptations of hydrophytes. (*Nymphaea* ,*Typha*) **Dataset** (web link) / **Experiment**: https://youtu.be/4dDfMY_dB3Q **Tasks:** Collect leaves of *Nymphaea* from a nearby pond or water body.
Lab 3	Study of anatomical adaptations of hydrophytes. (*Hydrilla, Pistia, Eicchornia*) **Dataset** (web link) / **Experiment**: https://youtu.be/VTvc01SsJqI **Tasks:** Prepare a comparative table showing the differences in anatomical adaptations among *Hydrilla*, *Pistia*, and *Eichhornia*.
Lab 4	Study of morphological adaptations of xerophytes. (*Opuntia, Aloe*) **Dataset** (web link) / **Experiment**: https://www.youtube.com/shorts/6BtP_YSB0Gw?feature=share **Tasks:** Examine the succulent, fleshy leaves of *Aloe*. Cut a leaf in half to observe the gel-like tissues inside.
Lab 5	Study of anatomical adaptations of xerophytes. (*Casurina, Acacia*) **Dataset** (web link) / **Experiment**: https://youtu.be/CrMcikV8qG0 **Tasks:** Create a comparative table showing the anatomical features of *Casuarina* and *Acacia*.
Lab 6	Quantitative analysis of herbaceous vegetation in the college campus for frequency **Dataset** (web link) / **Experiment**: https://youtu.be/hJnh4qXkC2E **Tasks:** Write a summary based on the frequency data, interpreting the distribution of herbaceous species across the campus.

Lab 7	Quantitative analysis of herbaceous vegetation in the college campus for density and abundance. **Dataset** (web link) / **Experiment**: https://youtu.be/O43ZFNnP4KU **Tasks:** Identify and count the individual herbaceous plants of all species present.
Lab 8	Quantitative analysis of herbaceous vegetation in the college campus for abundance. **Dataset** (web link) / **Experiment**: https://youtu.be/cS4qwSK-Mqw **Tasks:** Write a summary based on the abundance data. Describe the overall abundance of herbaceous vegetation in the college campus area, identifying any patterns in species distribution and population.
Lab 9	Identification of vegetation/various plants in college campus and comparison with Raunkiaer's frequency distribution law. **Dataset** (web link) / **Experiment**: https://youtu.be/c7FYZvsjTD0 **Tasks:** Identify the **dominant life forms** in the campus area.
Lab 10	Find out the alpha – diversity of plants in an area. **Dataset** (web link) / **Experiment**: https://www.youtube.com/shorts/IWQwrhMrzrU?feature=share **Tasks:** Choose a specific area of the campus or a nearby local environment to assess plant diversity. This could be a garden, lawn, woodland, or any other type of habitat.
Lab 11	Mapping of biodiversity hotspots of the world and India. **Dataset** (web link) / **Experiment**: https://www.youtube.com/shorts/SYxk3FOA26E?feature=share **Tasks:** Mark each hotspot with **colored markers** or **pins** to represent their location.
Lab 12	Mapping of phytogeographical regions of the globe and India. **Dataset** (web link) / **Experiment**: https://www.youtube.com/shorts/WSN8XlpQPKA?feature=share **Tasks:** An analysis of how **geography** (e.g., altitude, proximity to oceans) affects the distribution of plants

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Semester End Lab Examination

Title of the Paper: **Plant Ecology, Biodiversity and Phytogeography**

Semester: IV **Course Code: 23BOMAP242**

Time: 3 Hours **Credits: 01**

……

I. Answer the following.

Q1. Perform the given experiment 'A', write the procedure and results and draw neat labelled diagrams……**8M**

Q2. Take the T.S. of the material '**B**', make a temporary slide and justify the identification with specific reasons. Add note on ecological adaptations……**8M**

Q3. Explain the given experiment 'C', with the help of diagrams……..**8M**

Q4. Identify the following with specific reasons. **3X2=6M**

D, E and F

II .Viva **3 Marks**

III. Record **2 Marks**

Internals: 15M

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Title of the Paper: **Plant Resources and Utilization**

Course Code	**23BOMAL243**	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 :2021-22	Year of Offering: 2024 - 25	Year of Revision: --	Percentage of Revision: -

Course Description:

This course explores the diversity of plant resources, their roles in human societies, and their sustainable utilization. It provides a comprehensive understanding of the economic, ecological, and cultural significance of plants, including food crops, medicinal plants, fibres, timber, and other valuable resources.

The course covers topics such as plant taxonomy, ethno botany, and traditional uses of plants across different cultures. Students will also examine modern applications of plant resources in agriculture, pharmaceuticals, bioenergy, and industry, while addressing issues of conservation, biodiversity, and sustainability.

Through a combination of lectures, field studies, and laboratory work, students will gain practical skills in identifying, analysing, and sustainably managing plant resources. This course is ideal for students interested in botany, environmental science, agriculture, and natural resource management.

Course Aims and Objectives:

S.NO	**COURSE OBJECTIVES**
1	Understand Plant Diversity and Classification.
2	Analyze Plant Resources and Their Applications.
3	valuate the Role of Plants in Human Societies.
4	Assess the Importance of Plant Conservation.
5	Develop Skills in Plant Resource Management.

Course Outcomes:

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Identify major plant resources and their significance in society.	1	5	1
CO2	Evaluate traditional and modern uses of plants in various industries.	5	5	1
CO3	Analyze the ecological and economic roles of plants in global ecosystems.	4	5	1
CO4	Develop strategies for sustainable utilization and conservation of plant resources.	6	5	1
CO5	Interpret field studies and research on plant diversity and their applications.	5	5	1

CO-PO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1					1			3	
CO2					3			3	
CO3					2			3	
CO4					3			3	
CO5					3			3	

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Food plants** Centers of diversity of plants, Origin of crop plants. Domestication and introduction of crop plants; concepts of sustainable development. Cultivation, production, and uses of cereals(rice and wheat), major (jowar and bajra) and minor millets (finger millet, fox tail millet), pulse crops (red gram and black gram) and sugarcane. **Exercises/Projects:** Acritical assignment on origin of crop plants. **Specific Resources: (web)** **https://youtu.be/fDvxeeUrd-I**	9
II	Other Economic Plant Products A general account of oilseed crops and vegetable oils. A general account of fruit and vegetable yielding plants. Plant sources and economic importance of rubber, latex, gums, resins, dyes, alkaloids and tannins. A general account of major fiber crops in India; textile production from plant fibers. **Exercises/Projects:** Group discussion on various plant products and their source plants. **Specific Resources: (web)** **https://youtu.be/bSNVwOeS5e8**	9
III	Commercial plant Products A general account and economic potential of spices and condiments. Plant sources and economic importance of flavoring products, beverages, fumitories and masticatories and narcotics. Utilization of some important ornamentals, flowering plants and orchids. Exercises/Projects: A survey report on commercial plant product savailable in local markets. Specific Resources: (web) **https://youtu.be/uPHLj0oBtmM**	9
IV	Medicinal and Aromatic Plant Products Traditional and modern uses of some medicinal plants of India. Active compounds in medicinal plants and their pharmacological effects. Essential oils and their uses; aromatic plants in perfumery and cosmetics. Phytochemicals and their potential health benefits. **Exercises/Projects:** A case study report on phytomedicines used in human health care. **Specific Resources: (web)** **https://youtu.be/9MelpyoLmxo**	9
V	Timber Products and Energy Crops Important timber yielding plants of India; wood as a construction and manufacturing material. Other uses of wood products, such as paper and fuel. Energy crops, biofuels and bioplastics. Bamboos, *Eucalyptus, Casuarina* – generation of paper industry raw material. **Exercises/Projects:** A field trip to timber depots and silviculture plantations in their locality. **Specific Resources: (web)** **https://youtu.be/zfK7TLobsv0**	9

Text Books:

1. Pandey,B.P.(2013) College Botany, Volumes-II & III,S. Chand Publishing,NewDelhi
2. Bhattacharya,K.,G.Hait&Ghosh,A.K.,(2011)ATextBookofBotany,VolumeII,NewCentralBook Agency Pvt. Ltd., Kolkata
3. N.S.Subrahmanyam&A.V.S.S.Sambamurty(2008)EcologyNarosaPublishingHouse,NewDelhi
4. Sharma, P.D.(2012)EcologyandEnvironment.RastogiPublications,Meerut,India.

U.Kumar (2007) Biodiversity: Principles &Conservation, Agrobios(India), Jodhpur

5. Mani, M.S (1974) Ecology & Biogeography of India Dr. W. Junk Publishers, The Hague

References:

1. Kormondy, Edward J. (1996) Concepts of Ecology, Prentice-Hall of India Private Limited, New Delhi
2. Begon,M.,J.L.Harper&C.R.Townsend(2003)Ecology,BlackwellScienceLtd., U.S.A.

II. Eugene P. Odum (1996) Fundamentals of Ecology, Natraj Publishers, Dehradun

III. Kumar,H.D.(1992)ModernConceptsofEcology(7thEdn.,)VikasPublishingCo.,NewDelhi.

IV. Newman, E.I. (2000): Applied Ecology Blackwell Scientific Publisher, U.K.

V. Chapman, J.L&M.J. Reiss (1992): Ecology - Principles & Applications. Cambridge University Press, U.K.

VI. KumarH.D.(2000)Biodiversity&SustainableConservationOxford&IBHPublishingCoLtd.New Delhi.

VII. Cain, S.A. (1944) Foundations of Plant Geography Harper &Brothers, N.Y.

VIII. Good,R.(1997)TheGeographyofFloweringPlants(2ndEdn.)Longmans,Green&Co., Inc., London& Allied Science Publishers, New Delhi

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IV - SEMESTEREND EXAMINATIONS

PAPER – 11 **MODELPAPER** **Course Code: 23BOMAL243**

Title of the paper: Plant Resources and Utilization

Time: 3Hours **Max.Marks:70**

Section - A

Short Answer Questions (20 Marks)
Answer All questions. Each question carries 4 Marks.

Q1 (a) Explain about domestication. K2
OR
(b)Explain sustainable development. K2

Q2 (a) Explain about economic importance of alkaloids. K2
OR
(b)Summarize plant fibres. K2

Q3 (a) Illustrate narcotics. K2
OR
(b) Summarize orchids. K2

Q4 (a) List modern uses of medicinal plants. K1
OR
(b)What are essential oils? K1

Q5. (a) Define a note on seasoning of wood. K1
OR
(b)What are biofuel and its uses? K1

Section B

Long Answer Questions (50 Marks) **5x10=50**
Answer All questions. Each question carries 10 Marks.

Q6 (a) Explain the uses of Major millets (jowar &bajra). K5
OR
(b) Explain the uses of Minor millets (finger millet & tail millet). K5

Q7 (a) Explain about fruit & vegetable yielding plans. K5
OR
(b)Write essay on economic importance of rubber, & alkaloids. K5

Q8 (a) Explain the utilization of ornamental flowering plants.K5
OR
(b)Explain the economic importance of beverages. K5

Q9 (a) Explain about phytochemical and their potential benefits. K5
OR
(b)Prioritize medicinal plants and their pharmacological effects. K5

Q10 (a) List timber yielding plans in India. K4
OR
(b)Categorize the plants that are useful in paper industry as a raw material. K4

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IV - SEMESTEREND LAB EXAM

PAPER – 11 **MODELPAPER** **Course Code: 23BOMAP243**

Title of the paper: Plant Resources and Utilization. **Credits: 1**

Time: 3Hours **Max.Marks:50**

Course Description:

This hands-on laboratory course explores the vast potential of plant resources and their sustainable utilization. Students will engage in the identification, analysis, and application of economically and ecologically significant plants. The course emphasizes experimental techniques for extracting and characterizing plant-based compounds, studying plant physiology, and assessing their industrial, medicinal, and ecological value.

Key topics include the extraction of essential oils, analysis of secondary metabolites, evaluation of nutritional content, and the study of plant propagation techniques such as tissue culture. Students will also learn to apply modern analytical tools to assess the quality and functionality of plant-derived products. The course fosters an understanding of the role of plants in sustainable development and biodiversity conservation.

By the end of the course, students will gain practical skills in plant resource management and utilization, enabling them to contribute to industries like agriculture, pharmaceuticals, bioenergy, and environmental science.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To understand the external and internal morphology of common food crops.
2	To identify structural differences in fibers like cotton, jute, hemp, ramie, and sisal, and their industrial applications.
3	To understand the role of these plants in traditional and modern medicine.
4	To analyze the morphology and properties of oil-yielding crops.
5	To analyze firewood, biofuel, and timber plant characteristics, utility, and sustainability as resources.

Course Outcomes

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Develop skills to analyze and interpret plant samples using microscopic and chemical testing methods for various applications in botany and related industries.	K6	5	1
CO2	Identify the external features and stored materials (starch, proteins, oils) of selected food crops through morphological and chemical tests.	K6	5	1
CO3	Describe the morphological features of plants producing gums, resins, tannins, and dyes, and understand their significance in commercial and industrial applications.	K4	5	1
CO4	Differentiate plant fibers (cotton, jute, hemp, ramie, sisal) based on their morphology and microscopic structure, and describe their industrial applications.	K4	5	1
CO5	Assess the properties of oils derived from selected oil-yielding crops and explain their uses in food, industry, and biofuels.	K5	5	1

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1									
CO2									
CO3									
CO4									
CO5									

Course Structure:

This lab list covers the key areas of a Plant Resources and Utilization course, Providing hands - on practice with microscopic observations.

Lab 1	Study of morphology and micro – chemical test for stored material of *Oryza*. **Dataset** (web link) / **Experiment**: https://ijeab.com/upload_document/issue_files/41IJEAB-112201921-Studyof.pdf
Lab 2	Study of morphology and micro – chemical test for stored material of *Triticum*. **Dataset** (web link) / **Experiment**: https://www.researchgate.net/publication/376892745_Characterization_of_Wheat_Triticum_Spp_Varieties_on_the_Basis_of_Seed_Morphology.
Lab 3	Study of morphology and micro – chemical test for stored material of *Pennisetum.* **Dataset** (web link) / **Experiment**: https://www.sciencedirect.com/science/article/pii/S2588840420300457
Lab 4	Study of morphology and microscopic anatomy of cotton. **Dataset** (web link) / **Experiment**: https://nvlpubs.nist.gov/nistpubs/jres/26/jresv26n2p93_A1b.pdf
Lab 5	Study of morphology and microscopic anatomy of jute. **Dataset** (web link) / **Experiment**: https://www.sciencedirect.com/science/article/pii/S2405844021011452
Lab 6	Study of morphology and microscopic anatomy of hemp. **Dataset** (web link) / **Experiment**: https://www.sciencedirect.com/science/article/pii/S2405844022005643
Lab 7	Study of morphology, medicinal plant (*Vinca rosea*) and its useful parts. **Dataset** (web link) / **Experiment**: https://www.researchgate.net/publication/356382263_Phytochemical_and_Pharmacological_Properties_of_Catharanthus_roseus_Vinca
Lab 8	Study of morphology, aromatic plant (*Ocimum sanctum*) and its useful parts. **Dataset** (web link) / **Experiment**: https://ijrasb.com/index.php/ijrasb/article/view/251.
Lab 9	Study of oil yielding crop (*Ricinus communis*) and properties of its oil. **Dataset** (web link) / **Experiment**: https://www.scielo.br/j/cta/a/jtzR5bpyvr9Fm6WYDrRqt7t/
Lab 10	Study of gum yielding plant (*Acacia senegal*). **Dataset** (web link) / **Experiment**: https://www.feedipedia.org/node/342.
Lab 11	Study of resin yielding plant (*Pinus roxburghii*). **Dataset** (web link) / **Experiment**: https://www.sciencedirect.com/science/article/pii/S0926669023008701
Lab 12	Study of tannin yielding plant (*Prunus dulcis*). **Dataset** (web link) / **Experiment**: https://link.springer.com/article/10.1007/s10457-016-9964-5
Lab 13	Study of dye yielding plant (***Indigofera tinctoria***). **Dataset** (web link) / **Experiment**:

Lab 14	Study of fire wood yielding plant (***Eucalyptus).*** **Dataset** (web link) / **Experiment**: https://www.fao.org/4/ac772e/ac772e06.htm
Lab 15	Study of bio fuel yielding plant *(Pongamia)*. **Dataset** (web link) / **Experiment**: https://www.ofimagazine.com/content-images/news/Pongamia.pdf
Lab 16	Study of timber yielding plant (***Dalbergia***). **Dataset** (web link) / **Experiment**: https://en.wikipedia.org/wiki/Dalbergia_sissoo

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Semester End Lab Examination

PAPER – 11 **MODELPAPER** **Course Code: 23BOMAP243**

Title of the paper: Plant Resources and Utilization

Time: 3Hours **Max.Marks:35**

Semester End Lab Examination

I. Answer the following.

Q1. Identify the plant resource 'A', by physical and chemical tests. …….**8M**

Q2. Write the procedure and result for identification of bark resources….**8M**

Q3. Write the procedure and results for identification of fruit drugs……..**8M**

Q4. Identify the following with specific reasons. **3X2=6M**

D, E and F

II .Viva **3 Marks**

III .Record **2 Marks**

Internals : 15 M

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Value added course

PLANT NURSERY MANAGEMRNT

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:

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

Vuyyuru-521165, Krishna District, Andhra Pradesh

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 partsused for propagation. 3. Basic facilities for a nursery: layout and components of a goodnursery.	**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 plantnursery in brief. 3. Outlines of vegetative propagation techniques to produce plantingmaterial. 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 anddiseases. 3. Common possible errors in nursery activities. 4. Economics of nursery development, pricing and recordmaintenance. 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 showing 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**

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Vuyyuru-521165, Krishna District, Andhra Pradesh

Value Added Course

Title: PLANT NURSERY

Test Exercise:

1. Horticulture is the study that includes

a) Fruits, vegetables and flowers b) All food crops c) Vegetable gardens and lawns near hotels only d)Some bush crops and apples

2. Root suckers are

a) Insects that suck nutrients from the roots of plants
b) Shoots that arise from roots to form new plant
c) New plant parts that arise from the branches of fruit trees
d) Roots of neighbouring plants that share water with the another plant

3. A variety or strain produced by horticultural or agricultural techniques and not normally found in natural population is called

a) Hybrid b) Tissue culture c) GMO d) Cultivar

4. Cryopreservation is a technique used for

a)Crystallization of food b) Food packing
c) Seed saving d) Preservation of excess production of vegetables

5. In hybridization this is not part of the technique used

a) Transfer pollen b) Collect pollen
c) Emasculate d) Use of two plants to bridge the stems together

6. Tissue culture is a good technique to

a) Cross two varieties b) Rapidly increase the size of a tree by strengthening the stem
c) Eliminate virus d) Improve yield of crops

7. The following is not a plant growth regulator

a) Acetic acid b) Auxins c) Gibberellins d) Ethylene

8. Mycorrhizae is associated with the following

a) Formation of root nodules b) Hyphae penetrating the soil
c) Found mostly in lower plants d) Soil erosion

9. The pH in soils can be raised by adding

a) Sand b) lime c) sulphur d) nitrogen

10. In cold places frost damage can be reduced in horticultural crops using these methods except

a) Overhead sprinklers at night b) Green houses and shade nets
c) Wind breaks placement d) Appropriate fungicide application

11. 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 4. Application of fertilisers through
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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Vuyyuru-521165, Krishna District, Andhra Pradesh

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) carbandzim
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