G.T.N. ARTS COLLEGE (AUTONOMOUS)
DINDIGUL – 5

|Affiliated with Madurai Kamaraj University|
|Accredited with 'B' Grade by NAAC|

DEPARTMENT OF BOTANY

Allied Botany Syllabi For 2nd Year B.Sc., Zoology

Choice Based Credit System

Outcome Based Education - 2020 Regulation [OBE]

June 2021-2022 onwards

Program Specific Outcomes

After the completion of three year under graduation programme of Zoology, the students will be able to

PSO1	Demonstrate basic vital concepts and comprehensive knowledge of various disciplines of Life Sciences and to appreciate the complexity and rich diversity of living organisms, their bio chemical, physiological, ecological and evolutionary interrelationships between them and their environment.
PSO2	Classify the Animal Kingdom into different phyla, describe their salient features, identification, morphology, anatomy, physiology and parasitology of living organisms.
PSO3	Recognize and analyze the relationships between structure and functions at different levels of biological organizations (eg. biomolecules, metabolic pathway, genes, genome, cells, tissues, organs, organ systems, development of an organisms, populations and species) for the major group of animals.
PSO4	Construct basic skills in the physical, chemical, biological and statistical techniques, observation and study of nature, experimental skills and scientific investigation, modern scientific and IT tools and to attain the excellence in critical thinking and problem solving and apply that skills for the upliftment of one-self and the society.
PSO5	Develop scientific temper among the students for higher studies and keen interest in research and to have concern for the conservation of flora, fauna and live with scientific values.
PSO6	Develop and update domain knowledge in arts, science subjects relevant to the chosen career and clear the various levels of competitive exams.
PSO7	Be a part of nation building initiatives as a biologist to cultivate the character and courage to shoulder responsibilities to solve the environmental and epidemiological issues in the community.
PSO8	Impart personal and multidimensional skills and aware of applications of Life Sciences and to highlight the potential of various branches to become an entrepreneur.
PSO9	Demonstrate proficiency in communicating competently in groups and organizations, competence in interpersonal communication and to possess skills to deliver formal and informal presentations effectively.
PSO10	Understand and appreciate environmental conservation process and its importance, pollution control and biodiversity and protection of endangered species and to develop empathy and love towards animals.
PSO11	Inculcate a conviction to believe in self, impart professional and ethical attitude, nurture to be an effective team member, infuse leadership qualities, build proficiency in Biological skills and the abilities to relate with the social issues.
PSO12	Develop a passion to be an independent lifelong learner by imbibing real time changes in the socio - technological context, promoting continuous development and improvement of the knowledge and skills needed for employment and personal fulfillment.

Programme	**B.Sc. Zoology**	**Programme Code**	**UZO**
Course Code	**20UBOA11**	**Number of Hours/Cycle**	**4**
Semester	**III**	**Max. Marks**	**100**
Part	**III**	**Credit**	**4**
ALLIED COURSE - BOTANY			
Course Title	**Thallophytes &Archegoniates**		
Cognitive Level		**Up to K-3**	

Preamble

Botanical knowledge is important to appreciate the plant communities around us and this Course makes the student to understand the lower groups of plant forms and archegoniates with their significance and Economic Importance.

Unit I	**Thallophytes**	**15 Hours**
	Introduction – Brief outline of Classification of Algae (Fritsch, 1935) – General Characters of Algae – Salient Features of Chlorophyceae – Structure, Lifecycle and Economic importance of **Chlorella species** – Economic Importance of Algae. Brief Outline of Classification of Fungi (Alexopoulos & Charles W. Mims 1979) – General Characteristics of Fungi – Structure, Lifecycle and Economic Importance of ***Saccharomyces cerevisiae*** – Economic Importance of Fungi.	
Unit II	**Lichens**	**07 Hours**
	Introduction – Important Characters of Lichens – Structure and Lifecycle of **Usnea** species – Economic Importance of Lichens.	
Unit III	**Non-Vascular Cryptogams**	**12 Hours**
	Introduction to Cryptogams and Archegoniates – General Characters of Bryophytes – Brief Outline of Classification of Bryophytes (Rothmaler, 1951) – Alternation of Generations – Structure, Reproduction and Lifecycle of **Marchantia species** – Structure, Reproduction and Lifecycle of **Riccia species**. (Except Developmental Stages of Reproductive Organs).	
Unit IV	**Seedless Vascular Plants**	**14 Hours**
	Introduction – Characteristic Features of Pteridophytes – Brief Outline of Classification of Pteridophytes (G.M. Smith, 1955) – Alternation of Generations – Structure, Reproduction and Lifecycle of **Psilotum species** – Structure, Reproduction and Lifecycle of **Lycopodium species**. (Except Developmental Stages of Reproductive Organs).	
Unit V	**Naked Seeded Plants**	**12 Hours**
	Introduction – General Features of Gymnosperms – Brief Outline of Classification of Gymnosperms (Chamberline, 1910) – Structure, Reproduction and Lifecycle of **Pinus species** – Economic Importance of Gymnosperms. (Except Developmental Stages of Reproductive Organs).	

Pedagogy

Class Room Teaching, Power Point Presentation, Campus Walk, YouTube Videos.

Text Book

1. Annie Ragland, Kumaresan, V. and Arumugam, N., (2015), *A Text Book of Botany Volume-1*, Saras Publication, Tamil Nadu.

2. Annie Ragland, and Kumaresan, V., (2007), *Pteridophytes, Gymnosperms &Palaeobotany*, Saras Publication, Tamil Nadu.

Reference Books

1.Alexopolous, C.J. and Mims, C.W., (2010), *Introductory Mycology*, Wiley Eastern Limited, New Delhi.

2. Pandey, B.P., (2011), *College Botany Vol.-II*, S.Chand& Company Ltd., New Delhi.

E-Resources

- www.bryophytes.plants.siu.edu/bryojustified.html
- www.toppr.com/guides/biology-plant-kingdom/bryophytes
- www.legit.ng/1111992-economic-importance-algae.html

Course Outcomes

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

CO1	Apply the knowledge of general characters and economic importance of Algae and Fungi.
CO2	Make use of the acquired knowledge of Lichens and their economic importance.
CO3	Relate the Non-vascular Cryptogams with the Non-vascular Thallophytes and discuss the structure and life cycle of Marchantia and Riccia.
CO4	Interpret the characteristics features of Pteridophytes and describe the structure and life cycle of Psilotum and Lycopodium.
CO5	Identify the characters of Gymnosperms, life cycle of Pinus and organize the plant groups using the acquired knowledge.

Mapping of Course Outcomes (COs) with Programme Specific Outcomes (PSOs)

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**	**PSO 9**	**PSO 10**	**PSO 11**	**PSO 12**
CO1	3	-	2	-	-	1	-	-	-	2	-	-
CO2	3	-	2	-	-	1	-	-	-	2	-	-
CO3	3	-	2	-	-	1	-	-	-	2	-	-
CO4	3	-	2	-	-	1	-	-	-	2	-	-
C05	3	-	2	-	-	1	-	-	-	2	-	-

3-High, 2-Moderate, 1-Low

Articulation Mapping - K Levels with Course Outcomes (COs) for End Semester Examination

Units	COs	K-Level	Section A	Section B	Section C
			MCQs	Inbuilt Choice	Open Choice
			No. Of Questions K-Level	No. Of Questions K-Level	No. Of Questions K-Level
1	CO1	Up to K3	2 [K1, K2]	2 (K1,K2)	1 (K2)
2	CO2	Up to K3	2 [K1, K2]	2 (K2,K2)	1 (K2)
3	CO3	Up to K3	2 [K1, K2]	2 (K1,K2)	1 (K3)
4	CO4	Up to K3	2 [K1, K2]	2 (K1,K2)	1 (K3)
5	CO5	Up to K3	2 [K2]	2 (K1,K2)	1 (K3)
No of Questions to be asked			10	10	5
No of Questions to be answered			10	5	3
Marks for each Question			1	4	10
Total marks for each Section			10	20	30

K1 – Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving problems

Distribution of Section - wise Marks with K Levels (Model)

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Either/or)	Total Marks without Choice	% of Marks without Choice	Consolidated (Rounded off)
K1	4	16	-	20	20	20%
K2	6	24	20	50	50	50%
K3	-	-	30	30	30	30%
Total Marks	10	40	50	100	100	100%

Course Code 20UBOA11 **Lesson Plan**

Unit-I	**Topics Covered**	**15 Hours**	**Pedagogy**
Thallophytes	Introduction & Brief outline of Classification of Algae.	**1**	**Class room teaching, Power Point Presentation, Pictures.**
	General Characters of Algae & Salient features of Chlorophyceae.	**2**	
	Structure, reproduction, life cycle and economic importance of Chlorella species.	**3**	
	Economic importance of Algae.	**2**	
	Brief outline of Classification of Fungi & General characteristics.	**2**	
	Structure, Reproduction, Life Cycle and economic importance of Saccharomyces cerevisiae.	**3**	
	Economic importance of Fungi.	**2**	
Unit-II	**Topics Covered**	**07 Hours**	**Pedagogy**
Lichens	Introduction & Important characters of Lichens.	**2**	**Class room teaching, Power Point Presentation, Pictures.**
	Structure & Life cycle of Usnea species.	**4**	
	Economic importance of Lichens.	**1**	
Unit-III	**Topics Covered**	**12 Hours**	**Pedagogy**
Non-Vascular Cryptogams	Introduction to Cryptogams &Archegoniates.	**1**	**Class room teaching, Power Point Presentation, Pictures.**
	General characters of Bryophytes.	**1**	
	Brief outline of Classification of Bryophytes.	**1**	
	Alternation of Generations.	**1**	
	Structure, Reproduction and Life cycle of Marchantia species.	**4**	
	Structure, Reproduction and Life cycle of Riccia species.	**4**	
Unit-IV	**Topics Covered**	**14 Hours**	**Pedagogy**
Seedless Vascular Plants	Introduction & General characters of Pteridophytes.	**2**	**Class room teaching, Power Point Presentation, Pictures.**
	Brief Outline of Classification of Pteridophytes.	**1**	
	Alternation of Generations.	**1**	
	Structure, Reproduction and Life cycle of Psilotum.	**4**	
	Structure, Reproduction and Life cycle of Lycopodium.	**4**	
Unit-V	**Topics Covered**	**12 Hours**	**Pedagogy**
Naked Seeded Plants	Introduction and General Characters of Gymnosperms.	**2**	**Class room teaching, Power Point Presentation, Pictures.**
	Brief Outline of Classification of Gymnosperms.	**1**	
	Structure, Reproduction and Life cycle of Pinus.	**8**	
	Economic importance of Gymnosperms.	**1**	

Course Designed by: Dr. M. MUTHUMARI

Programme	**B.Sc., Zoology**	**Programme Code**	**UZO**
Course Code	**20UBOA21**	**Number of Hours/Cycle**	**4**
Semester	**IV**	**Max. Marks**	**100**
Part	**III**	**Credit**	**4**
ALLIED COURSE – BOTANY			
Course Title	**Biodiversity & Plant Biotechnology**		
Cognitive Level		**Up to K-3**	

Preamble

This course aims to bring to the knowledge of the students about the importance of biodiversity and its conservation. Further to acquire basic knowledge in the latest developments in plant biotechnology.

Unit I	**Biodiversity and Conservation**	**12 Hours**
	Introduction – Levels of Biodiversity a) Genetic b) Species and c) Ecological – Loss of Biodiversity – Extinction of Species: Types – Natural, Mass and Anthropogenic – Red Data Book and IUCN Red List – Causes of Biodiversity Losses – Biodiversity Conservation and Strategies – In Situ and Ex Situ.	
Unit II	**Mushroom Cultivation**	**12 Hours**
	Introduction to Mushroom – Types of Edible, Poisonous and Medicinal Mushrooms – Nutritive and Medicinal Values of Edible Mushrooms – General Aspect of Spawn Preparation – Mother spawn and Bed spawn preparation of Oyster Mushroom – Cultivation methods of Oyster and– Preservation of Mushrooms – Value Added Products.	
Unit III	**Organic Farming**	**10 Hours**
	Introduction to Compost and its Advantages - Preparation – Procedure and Methods: i) Indore ii) Bangalore iii) Mushroom Composting. Vermicompost: Introducion – Types of Earthworms in Vermicompost – Methods of Bed Preparation – Advantages of Vermicompost.	
Unit IV	**Plant Tissue Culture**	**12 Hours**
	Introduction – Concepts of Plant Tissue Culture – Basic Requirements of Laboratory – Formulation of Tissue Culture Medium – Types of Culture Medium – General Techniques in Plant Tissue Culture Production – Nucellus Culture – Embryo Culture – Meristem Culture – Anther Culture – Suspension Culture – Application of Plant Tissue Culture.	

Unit V	Bio-fertilizers & Nitrogen Fixation	14 Hours
	Bio-fertilizers: Introduction – Types of Biofertilizers (a brief account on Nitrogen Fixers, Phosphate Solubilizers and VAM Fungi) – Azolla Biofertilizer: Introduction – Mass Cultivation methods – Field Application of Azolla – Uses of Azolla as biofertilizer. **Nitrogen Fixation**: Role of Nitrogen in Plants - Sources of Nitrogen to plants - Biological Nitrogen Fixation – Free Living and Symbiotic – Mechanism of Biological Nitrogen Fixation.	

Pedagogy

Class Room Teaching, Power Point Presentation, Campus Walk, YouTube Videos.

Text Book

1. Annie Ragland, and Kumaresan, V., (2006).*Plant Ecology & Applied Botany*, Saras Publication, Tamil Nadu.

2. Arumugam, N. and Kumaresan, V., (2016). *Applied Plant Biotechnology*, Saras Publication, Tamil Nadu.

3. Kumaresan, V. and Arumugam, N., (2015).*Plant Ecology and Phytogeography*, Saras Publication, Tamil Nadu.

Reference Books

1. Dubey, R.C., (2007).*Textbook of Biotechnology,* S.Chand and Company Limited, New Delhi.

2. Shukla, R.S. and Chandel, R.S., (2003).*Plant Ecology*, S.Chand and Company Limited, New Delhi.

E-Resources

1. https://agritech.tnau.ac.in/org_farm/orgfarm_index.html

2. https://agritech.tnau.ac.in/farm_enterprises/Farm%20enterprises_%20Mushroom

3. https://agritech.tnau.ac.in/ta/org_farm/orgfarm_biofertilizers.html

4.https://agritech.tnau.ac.in/bio-tech/biotech_tc_notes.html

Course Outcomes [COs]

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

CO1	Make use of acquired knowledge in conservation of plant biodiversity.
CO2	Employ the knowledge to distinguish edible and non-edible mushrooms and demonstrate the spawn production and cultivation of Oyster mushroom.
CO3	Develop interest in usage of compost and apply the knowledge in utilizing the organic wastes in the preparation of vermicompost.
CO4	Describe the basic techniques in plant tissue culture and learn about the applications of tissue culture techniques.
CO5	Practice the application of Azolla bio-fertilizers and recognize the importance of biological nitrogen fixation.

Mapping of Course Outcomes (COs) with Programme Specific Outcomes (PSOs)

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**	**PSO 9**	**PSO 10**	**PSO 11**	**PSO 12**
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CO2	3	-	2	-	-	1	-	-	-	2	-	-
CO3	3	-	2	-	-	1	-	-	-	2	-	-
CO4	3	-	2	-	-	1	-	-	-	2	-	-
C05	3	-	2	-	-	1	-	-	-	2	-	-

3-High, 2- Moderate, 1- Low

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Marks for each Question			1	4	10
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K1	4	16	-	20	20	20%
K2	6	24	20	50	50	50%
K3	-	-	30	30	30	30%
Total Marks	10	40	50	100	100	100%

Course Code 20UBOA21 Lesson Plan

Unit-I **Biodiversity and Conservation**	**Topics Covered**	**12 Hours**	**Pedagogy**
	Introduction to Biodiversity: National and International levels.	1	Class room teaching, Power Point Presentation, Pictures.
	Levels of Biodiversity: Genetic, Species and Ecological.	2	
	Loss of Biodiversity.	1	
	Extinction of Species: Natural, Mass and Anthropogenic.	2	
	Red Data Book and IUCN List.	2	
	Causes of Biodiversity Loss.	1	
	Biodiversity Conservation Strategies: In Situ and Ex Situ.	3	
Unit-II **Mushroom Cultivation**	**Topics Covered**	**12 Hours**	**Pedagogy**
	Introduction to Mushrooms and Types of Edible and Non-edible mushrooms.	1	Class room teaching, Power Point Presentation, Pictures.
	Nutritive and Medicinal values of edible mushrooms.	2	
	Spawn production of Oyster mushroom	1	
	Cultivation methods of Oyster and White Button mushrooms.	5	
	Storage methods of mushrooms.	2	
	Value Added Products.	1	
Unit-III **Organic Farming**	**Topics Covered**	**10 Hours**	**Pedagogy**
	Introduction to Compost and its advantages.	1	Class room teaching, Power Point Presentation, Pictures.
	Preparation procedure and Methods: Indore, Bangalore and Mushroom composting.	2	
	Introduction to Vermicompost and its Advantages.	1	
	Types of Earthworms and its biological activities.	1	
	Methods of Bed preparation in Vermicompost production.	5	
Unit-IV **Plant Tissue Culture**	**Topics Covered**	**12 Hours**	**Pedagogy**
	Introduction & Concepts involved in Plant Tissue Culture.	1	Class room teaching, Power Point Presentation, Pictures.
	Basic requirements for Plant Tissue Culture.	1	
	Formulation of tissue culture medium and its types.	2	
	General techniques in plant tissue culture production.	3	
	Nucellus and Embryo culture techniques.	1	
	Meristem and Anther culture techniques.	1	
	Suspension culture.	1	
	Application of Plant Tissue Culture.	2	
Unit-V **Bio-fertilizers and Nitrogen Fixation**	**Topics Covered**	**14 Hours**	**Pedagogy**
	Introduction and types of Bio-fertilizers.	2	Class room teaching, Power Point Presentation, Pictures.
	Azolla Biofertilizer, Mass cultivation methods, field application and its uses.	3	
	Introduction to Nitrogen Fixation: Nitrogen, types of nitrogen available to plants.	1	
	Biological Nitrogen Fixation: Symbiotic type.	4	
	Biological Nitrogen Fixation: Non_Symbiotic type.	4	

Course Designed by Dr. M. Muthumari

ALLIED PRACTICAL - DEPARTMENT OF BOTANY

Part / Allied Practical Course	**III / I**	**Credit:**	**01**
Class:	**II B.Sc., Zoology**	**No. of Hours / Cycle**	**02**
Semester:	**IV**	**No. of Hours / Semester**	**30**
Course Title:	**Thallophytes, Archegoniates, Biodiversity & Plant Biotechnology**	**Max. Marks**	**100**
Course Code:	**20UBOA2P**	**Internal Marks – 40** **External Marks - 60**	

THALLOPHYTES, ARCHEGONIATES, BIODIVERSITY & PLANT BIOTECHNOLOGY

Course Outcomes

Learners acquire experimental skills required in mounting techniques of various parts of the specified plant species and to understand the internal structures. Further, they have hands-on experience in mushroom cultivation, vermicompost and organic compost preparations.

1. Micro Preparation and identification of the specimens mentioned below:
   Algae: Chlorella — Fungi: Saccharomyces cerevisiae
   Bryophytes: Marchantia & Riccia
   Pteridophytes: Psilotum & Lycopodium — Gymnosperms: Pinus
2. To observe and identify the permanent slides / the macroscopic jar specimens / photos of species mentioned above.
3. Make dissection of plant parts like Thallus / Rhizome / Aerial Axis / Leaves of Marchantia, Riccia, Psilotum, Lycopodium and Pinus.
4. Spotters – Identification of Jar Specimens or Permanent Slides from Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms included in the Syllabus.
5. Preparation of mushroom beds and vermicompost beds.
6. Maintenance of Observation Note Book and Submission of the same during Practical Examination.

DEPARTMENT OF BOTANY – ALLIED PRACTICAL

Marks Allotted

Internal Test - 40 Marks

End Semester Examination - 60 Marks

Total - 100 Marks

Components of Internal Test – 40 marks

1. Attendance – Not less than 70% (21 days out of 30 days from 2 Semesters) -10 marks
2. Internal Test – Two Tests – each carrying 10 marks - 20 marks
3. Observation Note Book -10 marks

End-Semester Examination – 60 marks

1. Written Examination – 50 marks
2. Record Note Book – 10 marks

Passing Mark - Minimum 24 (out of 60 marks) for External Examination

Eligibility for the Degree - Passing Minimum is 40% (both Internal & External)

Examination Pattern for Allied Courses to be implemented from the Academic Year 2021-2022

Two Continuous Internal Assessment Tests (CIA) and One End Semester Examination (ESE) are conducted .The marks are distributed as follows:

Nature of Evaluation	CIA	ESE	Total
Theory	40	60	100
Practical	40	60	100

Continuous Internal Assessment (CIA) - UG

The pattern of question paper for III and IV semesters is as follows. The duration for the internal test is 1½ hours. Equal importance is given to all the units.

Blue Print of the Question Paper (CIA) Maximum Marks: 30

Section	Types of questions	No. of questions to be asked	No. of questions to be answered	Marks for each question	Total Marks
A	Multiple Choice Questions	6	6	1	6
B	Paragraph Questions (Inbuilt Choice)	6	3	4	12
C	Essay Questions (Open Choice)	3	2	6	12
Total					30

Components for Continuous Internal Assessment Tests are:

1. Two internal assessment tests is conducted for 30 marks each
   (The average marks of the two internal assessment tests will be taken ((**30 + 30/ 2)** = 30)
2. Two Assignments to be submitted for 5 marks each
   (The average of two assignments is taken for 5 marks)
3. Seminar / Quiz / Group Discussion – 5 marks
   (If Quiz is conducted, the average of two quizzes is taken for 5 marks)
4. Third test may be allowed for absentees of anyone of the two assessments for genuine reasons.

End Semester Examinations (ESE)

Duration of the End Semester Examination is 2 Hours. Equal importance is given to all the units. The pattern of Question Paper for the End Semester Examination is as follows:

Blue Print of the Question Paper (UG) Maximum Marks: 60

Sections	Types of questions	No. of questions to be asked	No. of questions to be answered	Marks for each question	Total Marks
A	Multiple Choice Questions	10	10	1	10
B	Paragraph Questions (Inbuilt Choice)	10	5	4	20
C	Essay type Questions (Open Choice)	5	3	10	30
	Total				60

Evaluation Pattern for Under Graduate

1. Passing minimum is 35% in external examination, i.e. 21 out of 60 will be taken as pass mark for UG students.
2. There is no minimum pass mark for internal tests.
3. An aggregate of 40 marks for UG (sum of Continuous Internal Assessment and End Semester Examination).

Examination Pattern for Part IV Courses

Regarding Part IV Courses, such as Skill Based, Non Major Elective. Value Education, and Environmental Studies, Two Continuous Internal Assessment Tests (CIA) and One End Semester Examination (ESE) are conducted .The marks are distributed as follows:

Nature of Study	CIA	ESE	Total
Theory	20	30	50
Practical	20	30	50

Continuous Internal Assessment (CIA) - UG

The pattern of question paper for Continuous Internal Assessment (CIA) for UG is as follows. The duration for the internal test is 1 hour. Equal importance is given to all the units.

Blue Print of the Question Paper (CIA) Maximum Marks: 15

Sections	Types of questions	No. of questions	No. of questions to be answered	Marks for each question	Total Marks
A	Paragraph Questions	5	5	2	10
B	Essay type Questions (open choice)	2	1	5	5
Total					15

Components for Continuous Internal Assessment

1. Two internal tests are conducted for 15 marks each
   (The average of the marks of two internal assessments will be taken
   ((**15+15) / 2)** = 15)
2. One Assignment is to be submitted for 5 marks.

End Semester Examinations (ESE)

Duration of the End Semester Examination is 2 Hours. Equal importance is given to all the units. The pattern of Question Paper for the End Semester Examination is as follows:

Blue Print of the Question Paper (UG) Maximum Marks: 30

Sections	Types of questions	No. of questions	No. of questions to be answered	Marks for each question	Total Marks
A	Paragraph Questions	5	5	3	15
B	Essay type Questions (open choice)	5	3	5	15
Total					30

Evaluation Pattern for Under Graduate

1. Passing minimum is 35% in external examination, i.e. 11 out of 30 will be taken as pass mark for UG students.
2. There is no minimum pass for internal tests.
3. An aggregate of 40 marks for UG (sum of Continuous Internal Assessment and End Semester Examination).

Examination Pattern for Value Added Courses

Regarding Extra Credit Value Added Courses, the study material will be prepared by the course teacher. One Internal Assessment will be conducted for 25 marks and the End Semester Examination will be conducted for 50 marks and the evaluation will be made by the course teacher. The marks are distributed as follows:

Nature of Study	CIA	ESE	Total
Theory	20	30	50
Practical	20	30	50

Continuous Internal Assessment (CIA)

The pattern of question paper for Continuous Internal Assessment (CIA) for UG is as follows. The duration for the internal test is 1 hour. Equal importance is given to all the units.

Blue Print of the Question Paper (CIA) Maximum Marks: 15

Sections	Types of questions	No. of questions	No. of questions to be answered	Marks for each question	Total Marks
A	Paragraph Questions	5	5	2	10
B	Essay type Questions (open choice)	2	1	10	10
Total					20

End Semester Examinations (ESE)

Duration of the End Semester Examination is 3 Hours. Equal importance is given to all the units. The pattern of Question Paper for the End Semester Examination is as follows:

Blue Print of the Question Paper Maximum Marks: 30

Sections	Types of questions	No. of questions	No. of questions to be answered	Marks for each question	Total Marks
A	Paragraph Questions	5	5	3	15
B	Essay type Questions (open choice)	5	3	5	15
Total					30

Evaluation Pattern - Under Graduate

1. Passing minimum is 35% in external examination, i.e. 11 out of 30 will be taken as pass mark for UG students.
2. There is no minimum pass for internal tests.
3. An aggregate of 40 marks for UG (sum of Continuous Internal Assessment and End Semester Examination).

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DINDIGUL – 5

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DEPARTMENT OF BOTANY

Allied Botany Syllabi for 3rd Year B.Sc., Zoology

Outcome Based Education - 2020 Regulation [OBE]

June 2022-2023 onwards

Program Specific Outcomes

After the completion of three year under graduation programme of Zoology, the students will be able to

PSO1	Demonstrate basic vital concepts and comprehensive knowledge of various disciplines of Life Sciences and to appreciate the complexity and rich diversity of living organisms, their bio chemical, physiological, ecological and evolutionary interrelationships between them and their environment.
PSO2	Classify the Animal Kingdom into different phyla, describe their salient features, identification, morphology, anatomy, physiology and parasitology of living organisms.
PSO3	Recognize and analyze the relationships between structure and functions at different levels of biological organizations (e.g. biomolecules, metabolic pathway, genes, genome, cells, tissues, organs, and organ systems, development of an organisms, populations and species) for the major group of animals.
PSO4	Construct basic skills in the physical, chemical, biological and statistical techniques, observation and study of nature, experimental skills and scientific investigation, modern scientific and IT tools and to attain the excellence in critical thinking and problem solving and apply that skills for the upliftment of one-self and the society.
PSO5	Develop scientific temper among the students for higher studies and keen interest in research and to have concern for the conservation of flora, fauna and live with scientific values.
PSO6	Develop and update domain knowledge in arts, science subjects relevant to the chosen career and clear the various levels of competitive exams.
PSO7	Be a part of nation building initiatives as a biologist to cultivate the character and courage to shoulder responsibilities to solve the environmental and epidemiological issues in the community.
PSO8	Impart personal and multidimensional skills and aware of applications of Life Sciences and to highlight the potential of various branches to become an entrepreneur.
PSO9	Demonstrate proficiency in communicating competently in groups and organizations, competence in interpersonal communication and to possess skills to deliver formal and informal presentations effectively.
PSO10	Understand and appreciate environmental conservation process and its importance, pollution control and biodiversity and protection of endangered species and to develop empathy and love towards animals.
PSO11	Inculcate a conviction to believe in self, impart professional and ethical attitude, nurture to be an effective team member, infuse leadership qualities, build proficiency in Biological skills and the abilities to relate with the social issues.
PSO12	Develop a passion to be an independent lifelong learner by imbibing real time changes in the socio - technological context, promoting continuous development and improvement of the knowledge and skills needed for employment and personal fulfillment.

Programme	**B.Sc., Zoology**	**Programme Code**	**UZO**
Course Code	**20UBOA31**	**Number of Hours / Cycle**	**4**
Semester	**V**	**Max. Marks**	**100**
Part	**III**	**Credit**	**4**
ALLIED COURSE - BOTANY			
Course Title	**Angiosperm Taxonomy, Embryology, Ethnobotany& Economic Botany**		
Cognitive Level		**Up to K3**	

Preamble

Botanical knowledge is important to appreciate the plant communities around us and this Course makes the student to understand the higher groups of plant forms, their fertilization process and selected economically important medicinal and crop plants and their products.

Unit I	**Angiosperm Taxonomy I**	**12 Hours**
	History, Scope and Importance of Plant Taxonomy - Botanical Nomenclature: Rules, Regulation and Recommendation – Typification - Taxonomical Hierarchies – Morphological Description of Typical Angiosperm Plant - Natural System of Plant Classification (Bentham and Hookers') Merits and Demerits – Chemotaxonomy – Molecular Taxonomy.	
Unit II	**Angiosperm Taxonomy II**	**12Hours**
	Vegetative, Floral Characteristics and Economic Importance of the Families: Acanthaceae, Rubiaceae, Solanaceae, Meliaceae, Bignoniaceae and Poaceae.	
Unit III	**Embryology of Angiosperms**	**12 Hours**
	Parts of Typical Angiospermic Flower – Structure of Stamen and Anther - Male Gametophyte Development – Structure and Types of Ovules - Female Gametophyte Development – Structure of Embryosac – Pollination and its Types – Double Fertilization and Triple Fusion – Endosperm: Types and Functions.	
Unit IV	**Ethnobotany**	**12Hours**
	Definition - Indigenous medical knowledge of Indian Tribes – Traditional Systems of Medicine – Different Drug Formulations in Siddha, Ayurveda – Classification of Medicinal Plants based on Mode of Action – Collection, Processing and Medicinal Values of important Medicinal Plants: Root- *Rauvolfia species*; Rhizome - *Curcuma longa*;	

	Leaves – *Ocimum species*; Stem- *Aloe vera*. Brief account on Biopiracy.	
Unit V	**Economic Botany**	**12 Hours**
	Introduction - Botanical Name, Morphology, Useful Parts and Uses of: **Cereals**: Rice, Wheat, and Ragi. **Pluses**: Black gram, Green gram and Soybean. **Vegetables**: Tomato, Brinjal and Carrot. **Spices**: Pepper and Cinnamon. **Essential Oils**: Eucalyptus and Lemongrass.	

Pedagogy

Class Room Teaching, Power Point Presentation, Campus Walk, YouTube Videos.

Text Books

1.Kumaresan, V., and Annie Ragland (2004). *Taxonomy of Angiosperms*, Saras Publication, Tamil Nadu.

2. Kumaresan, V., (2015). *Herbal Biotechnology and Pharmacognosy*, Saras Publication, Tamil Nadu.

Reference Books

1. Sharma, O.P., (2006). *Plant Taxonomy*, Tata McGraw-Hill Publishing Company Limited, New Delhi.

2. Bhojwani, S.S., and Bhatnagar, S.P., (1988).*The Embryology of Angiosperms*, Vikas Publishing House Private Limited, New Delhi.

3. Sharma, O.P., (1996). *Hill's Economic Botany*, Tata McGraw-Hill Publishing Company Limited, New Delhi.

4.Sambamurty, AVSS., and Subrahmanyam, N.S., (2008). *A Textbook of Modern Economic Botany*. 1st Edition, Paperback. CBS Publishers & Distributors Pvt. Ltd. New Delhi.

E-Resources

- https://en.wikipedia.org/wiki/Chemotaxonomy
- http://botanicaldimensions.org/what-is-ethnobotany/
- https://onlinecourses.swayam2.ac.in/cec21_bt22/preview
- https://www.nhp.gov.in/introduction-and-importance-of-medicinal-plants-and-herbs_mtl
- https://www.researchgate.net/publication/346430554_Cultivation_Collection_and_Processing_of_Medicinal_Plants

Course Outcomes

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

CO1	Interpret the taxonomical knowledge and apply the plant nomenclature in real life situation.
CO2	Demonstrate the vegetative, floral characters of the selected angiosperm plants and Enumerate their economic importance. Identify, classify the plants by using the key characters.
CO3	Illustrate various parts of flowers and apply the knowledge of pollination and fertilization and its types.
CO4	Understand the traditional system of medicine. Apply techniques of drug formulation in human life.
CO5	Apply the knowledge of the diversity of crop plants and practice the plant products in everyday life.

Mapping of Course Outcomes (COs) with Programme Specific Outcomes (PSOs)

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**	**PSO 9**	**PSO 10**	**PSO 11**	**PSO 12**
CO1	3	3	-	-	-	2	-	-	-	-	-	-
CO2	3	3	2	-	-	2	-	-	-	-	-	-
CO3	3	-	2	-	-	2	-	-	-	-	-	-
CO4	3	-	-	-	3	2	1	2	-	-	-	-
C05	3	-	-	1	2	2	-	2	-	3	-	-

3-High, 2-Moderate, 1-Low

Articulation Mapping [K-Levels with Course Outcomes (COs) for End Semester Examination]

Units	COs	K-Level	Section A	Section B	Section C
			MCQs	Inbuilt Choice	Open Choice
			No. of Questions [K-Level]	No. of Questions [K-Level]	No. of Questions [K-Level]
1	CO1	Up to K2	2 [K1]	2 [K1,K1]	1 [K2]
2	CO2	Up to K2	2 [K1]	2 [K2,K2]	1 [K2]
3	CO3	Up to K2	2 [K1]	2]K1,K1]	1 [K2]
4	CO4	Up to K3	2 [K1]	2 [K2,K2]	1 [K3]
5	CO5	Up to K3	2 [K1]	2 [K2,K2]	1 [K3]
No of Questions to be asked			10	10	5
No of Questions to be answered			10	5	3
Marks for each Question			1	4	10
Total marks for each Section			10	20	30

K1 – Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving problems

Distribution of Section-wise Marks with K-Levels

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks without Choice	% of Marks without Choice	Consolidated (Rounded off)
K1	10	16	-	26	26	26%
K2	-	24	30	54	54	54%
K3	-	-	20	20	20	20%
Total Marks	10	40	50	100	100	100%

Course Code: 20UBOA31 **Lesson Plan**

	Topics Covered	12 Hours	Pedagogy
Unit-I **Angiosperm Taxonomy I**	History of Angiosperm Taxonomy	**1**	**Class room teaching, Power Point Presentation, Photos.**
	Scope and Importance of Plant Taxonomy	**1**	
	Botanical Nomenclature: Rules, Regulation and Recommendation	**2**	
	Typification - Taxonomical Hierarchies	**2**	
	Morphological Description of Typical Angiosperm Plant - –	**2**	
	General System of Plant Classification	**1**	
	Natural System of Plant Classification (Bentham and Hookers') Merits and Demerits	**2**	
	Chemotaxonomy – Molecular Taxonomy.	**1**	
Unit-II **Angiosperm Taxonomy II**	**Topics Covered**	**12 Hours**	
	Vegetative, Floral Characteristics and Economic Importance of the Family Acanthaceae.	**2**	
	Vegetative, Floral Characteristics and Economic Importance of the Family Rubiaceae.	**2**	
	Vegetative, Floral Characteristics and Economic Importance of the Family Solanaceae.	**2**	
	Vegetative, Floral Characteristics and Economic Importance of the Family Meliaceae.	**2**	
	Vegetative, Floral Characteristics and Economic Importance of the Family Bignoniaceae.	**2**	
	Vegetative, Floral Characteristics and Economic Importance of the Family Poaceae.	**2**	
Unit-III **Embryology of Angiosperm**	**Topics Covered**	**12 Hours**	
	Parts of Typical Angiospermic Flower	**1**	
	Structure of Stamen and Anther	**1**	
	Structure of Pollen Grains	**1**	
	Male Gametophyte Development	**1**	
	Structure and Types of Ovules	**1**	
	Female Gametophyte Development	**1**	
	Structure of Embryosac	**1**	
	Pollination and its Types	**3**	

	Double Fertilization and Triple Fusion	**1**	
	Endosperm: Types and Functions	**1**	
Unit-IV **Ethnobotany**	**Topics Covered**	**12 Hours**	
	Introduction to Ethnobotany	**1**	
	Indigenous medical knowledge of Indian Tribes	**1**	
	Traditional Systems of Medicine	**1**	
	Different Drug Formulations in Siddha, Ayurveda	**2**	
	Classification of Medicinal Plants based on Mode of Action – Collection, Processing	**2**	
	Root- *Rauvolfia species*	**1**	
	Rhizome - *Curcuma longa*	**1**	
	Leaves – *Ocimum species*	**1**	
	Stem- *Aloe vera*	**1**	
	Brief account on Biopiracy	**1**	
Unit-V **Economic Botany**	**Topics Covered**	**12 Hours**	
	Introduction and Importance of Economic Botany.	**1**	
	Botanical Name, Morphology, Useful Parts and Uses of **Cereals**: Rice, Wheat, and Ragi.	**3**	
	Botanical Name, Morphology, Useful Parts and Uses of **Pluses**: Black gram, Green gram and Soybean	**2**	
	Botanical Name, Morphology, Useful Parts and Uses of **Vegetables**: Tomato, Brinjal and Carrot	**2**	
	Botanical Name, Morphology, Useful Parts and Uses of **Spices**: Pepper and Cinnamon.	**2**	
	Botanical Name, Morphology, Useful Parts and Uses of **Essential Oils**: Eucalyptus and Lemongrass.	**2**	

Course Designed by: Dr. M. MUTHUMARI

Programme	**B.Sc., Zoology**	**Programme Code**	**UZO**
Course Code	**20UBOA41**	**Number of Hours/Cycle**	**4**
Semester	**VI**	**Max. Marks**	**100**
Part	**III**	**Credit**	**4**
ALLIED COURSE – BOTANY			
Course Title	**Plant Physiology & Forestry**		
Cognitive Level		**Up to K-3**	

Preamble

This course aims to bring to the knowledge of the students about the requirements of mineral nutrients to plants, role of light and dark periods in plant growth and flowering, process of photorespiration and forest and its importance in the environment.

Unit I	**Mineral Nutrients of Plants**	**12 Hours**
	Water and its importance to Plants - Imbibition - Diffusion - Osmosis. Water Absorption: Active and Passive Transport and Translocation - Ascent of Sap - Absorption of Minerals - Macro and Micronutrients (N, P, K, Mg, Zn and Mo) - Importance and their deficiency symptoms. Brief account on Hydroponic - Aquaponic - Aeroponic farming systems.	
Unit II	**Photosynthesis**	**12 Hours**
	Photosynthesis: Introduction and Advantages – Structure of Chloroplast and types of Pigments – Photolysis - Emerson Enhancement Effect - Pigment Systems: PS-II - PS-I and Cyto-b6 - Photophosphorylation: Cyclic and Non-Cyclic - Electron Transport System: Cyclic and Non-Cyclic – Structure of Mitochondria - Oxidative Phosphorylation: Glycolysis - Citric Acid Cycle - Mitochondrial Electron Transport - Brief account on Bacterial Photosynthesis.	
Unit III	**Photoperiodism &Vernalization** Introduction - Short Day Plants – Long Day Plants – Day Neutral Plants. Brief account– Phytochrome, Cryptochrome. **Vernalization**: Introduction - Mechanism of Vernalization: Phasic Development Theory and	**12 Hours**

	Hormonal Theory. Growth Hormones: Practical applications of Auxin, Gibberellin, Cytokinin and Ethylene.	
Unit IV	**Forestry I**	**12 Hours**
	Introduction – Definition - Types of Forest in India (Champion & Seth 1983) - Importance and Values of Forest and its Products. Non Wood Forest Products - Direct and Indirect NWFP and their economic values. Threats of Forest: Overexploitation, hunting, gathering and mining.	
Unit V	**Forestry II**	**12 Hours**
	Conservation of Forest Resources – Afforestation - Social Forestry - Indian Forest and Wild Life Acts - Endemic Flora of India - Conservation: *in situ* and *ex situ* methods - Protected Areas – National Park – Wild Life Sanctuaries and Biosphere Reserves – Role of Biotechnology in Forest Conservation – Brief account on Carbon Foot Print – Carbon Sequestration.	

Pedagogy

Class Room Teaching, Power Point Presentation, Campus Walk, YouTube Videos.

Text Books

1. Annie, R., Rajkumar, K., Jayakumar, M. and Rajarathinam, K. (2009). *Plant Physiology*, Saras Publication, Tamil Nadu.

2. Kumaresan, V., and Arumugam, N. (2015). *Plant Ecology & Phytogeography*, Saras Publication, Tamil Nadu.

3. Verma, S.K., and MohitVerma (2019). *A Textbook of Plant Physiology, Biochemistry and Biotechnology*, S. Chand & Company Ltd., New Delhi.

Reference Book

1. Jain, V.K., (2011). *Fundamentals of Plant Physiology*, S. Chand & Company Ltd., New Delhi.

2. Manikandan, K., and Prabu, S. (2021). Indian Forestry, Jain Brothers, New Delhi.

E-Resources

- https://vikaspedia.in/agriculture/crop-production/integrated-nutrient-management/what-is-plant-nutrition
- https://byjus.com/biology/photoperiodism/
- https://agricoop.nic.in/sites/default/files/National%20Agroforestry%20Policy%202014.pdf
- https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/
- https://en.wikipedia.org/wiki/Carbon_footprint
- Ecomatcher.com/how-to-calculate-co2-sequestration

Course Outcomes [COs]

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

CO1	Understand the role of mineral nutrients and apply the knowledge of deficiency symptoms and understand the techniques of hydroponics, aeroponics.
CO2	Understand the various physiological processes in plants. Gain knowledge about various mechanisms such as Oxidative Phosphorylation, Glycolysis, and Citric acid cycle and Mitochondrial electron transport.
CO3	Understand the response of plants to the photoperiod and cold treatment and understand the application of various plant growth hormones.
CO4	Demonstrate the knowledge of forest vegetation, understand the Non Wood Forest Products and their economic values and threats of forests.
CO5	Acquire knowledge on forest conservation methods and strategies. Develop interest in understanding and applying carbon foot print and carbon sequestration.

Mapping of Course Outcomes (COs) with Programme Specific Outcomes (PSOs)

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
CO1	3	-	2	-	-	1	-	-	-	2	-	-
CO2	3	-	2	-	-	1	-	-	-	2	-	-
CO3	3	-	2	-	-	1	-	-	-	2	-	-
CO4	3	-	2	2	-	1	2	-	-	2	-	-
C05	3	-	2	2	1	1	2	-	-	2	-	-

3-High, 2- Moderate, 1- Low

Articulation Mapping [K- Levels with Course Outcomes (COs) for End Semester Examination]

Units	COs	K-Level	Section A	Section B	Section C
			MCQs	Inbuilt Choice	Open Choice
			No. Of Questions K-Level	No. Of Questions K-Level	No. Of Questions K-Level
1	CO1	Up to K2	2 [K1]	2 (K1,K1)	1 (K2)
2	CO2	Up to K2	2 [K1]	2 (K2,K2)	1 (K2)
3	CO3	Up to K2	2 [K1]	2 (K1,K1)	1 (K2)
4	CO4	Up to K3	2 [K1]	2 (K2,K2)	1 (K3)
5	CO5	Up to K3	2 [K1]	2 (K2,K2)	1 (K3)
No of Questions to be asked			10	10	5
No of Questions to be answered			10	5	3
Marks for each Question			1	4	10
Total marks for each Section			10	20	30

K1 – Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving problems

Distribution of Section-Wise Marks with K-Levels

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Either/or)	Total Marks without Choice	% of Marks without Choice	Consolidated (Rounded off)
K1	10	16	-	26	26	26%
K2	-	24	30	54	54	54%
K3	-	-	20	20	20	20%
Total Marks	10	40	50	100	100	100%

Course Code: 20UBOA41 **Lesson Plan**

Unit-I	**Topics Covered**	**12 Hours**	**Pedagogy**
Mineral Nutrition of Plants	Water and its importance to Plants	1	Class room teaching, Power Point Presentation, Picture
	Imbibition - Diffusion - Osmosis	2	
	Water Absorption: Active and Passive Transport	1	
	Translocation of Water	1	
	Ascent of Sap	1	
	Minerals, Absorption and its Importance to Plants	1	
	Macronutrients, Importance and their deficiency symptoms - N, P, K and Mg.	2	
	Micronutrients, Importance and their deficiency symptoms – Zn and Mo.	1	
	Brief account on Hydroponic	1	
	Brief account Aquaponic - Aeroponic farming systems	1	
Unit-II	**Topics Covered**	**12 Hours**	
Photosynthesis	Photosynthesis: Introduction and Advantages.	1	
	Photolysis; Emerson Enhancement Effect	1	
	Structure of Chloroplast and type of Pigments.	1	
	Light Reaction	2	
	Dark Reaction	2	
	Structure of Mitochondria	1	
	Oxidative Phosphorylation	1	
	Glycolysis	1	
	Citric Acid Cycle - Mitochondrial Electron Transport	1	
	Bacterial Photosynthesis	1	
Unit-III	**Topics Covered**	**12 Hours**	
Photoperiodism &Vernalization	Introduction to Photopeiodism	1	
	Short Day Plants	1	
	Long Day Plats	1	
	Day Neutral Plants	1	
	Phytochrome and its types and function	1	
	Cryptochrome and its types and function	1	
	Introduction to Vernalization	1	
	Phasic Development and Hormonal	1	

	Theory		
	Auxin	1	
	Gibberellins	1	
	Cytokinin	1	
	Ethylene	1	
Unit-IV	**Topics Covered**	**12 Hours**	
	Introduction to Forest and its types	1	
Forestry I	Importance and Values of Forest Products	2	
	Non-Wood Forest Products	1	
	Direct NWFP	2	
	Indirect NWFP	2	
	Overexploitation	1	
	Hunting	1	
	Gathering	1	
	Mining	1	
Unit-V	**Topics Covered**	**12Hours**	
	Forest Resources and Conservation	1	
Forestry II	Afforestation	1	
	Social Forestry	1	
	Indian Forest and Wild Life Acts	1	
	Endemic Flora of India	1	
	Conservation: *In Situ* and *Ex Situ*	1	
	Protected Area of Forest	2	
	Biotechnology in Forest Conservation	2	
	Carbon Foot Print	1	
	Carbon Sequestration	1	

Course Designed by Dr. M. Muthumari

PRACTICAL COURSE

Part / Allied Practical Course	**III / II**	**Credit:**	**01**
Class	**III B.Sc., Zoology**	**No. of Hours / Cycle**	**02**
Semester	**VI**	**No. of Hours / Semester**	**30**
Course Title	**Angiosperm Taxonomy, Embryology, Ethnobotany, Economic Botany, Plant Physiology and Forestry**	**Max. Marks**	**100**
Course Code	**20UBOA4P**	**Internal Marks – 40** **External Marks – 60**	

COURSE OUTCOME

Learners acquire experimental skills required in describing vegetative and floral characters of angiosperm plants, identification of permanent slides of embryological specimens, identification of some medicinal and economically important plants, demonstration of physiological setup and identification of pictures related to Forestry.

1. Observation of dissected, vegetative and floral characters of selected families mentioned in the syllabus.
2. Observation of sections of permanent slides of anther, pollen, ovules.
3. Identification of selected spotters of cereals, pulses, essential oil, vegetables and beverages with botanical name, family, morphology of useful parts and uses.
4. Demonstration of oxygen evolution during Photosynthesis by Test tube and funnel experiment.
5. Identification and importance of selected NWFP.
6. Dissection and observation of embryo from Tridax.
7. Demonstration of Photoperiodism response in plants.
8. Observation of Mineral deficiency in crop plants.
9. Understanding carbon foot print and carbon sequestration.
10. Field visit to Forest Research Institute at Coimbatore.
11. Maintaining Record Notebook for external valuation.

PRACTICAL COURSE

Marks Allotted

Internal Test - 40 Marks

End Semester Examination - 60 Marks

Total - 100 Marks

Components of Internal Test

1. Attendance – Not less than 70%
(21 days out of 30 days from 2 Semesters) -10 marks

2. One Internal Model Test - 20 marks

3. Observation Note Book -10 marks

Components of End Semester Examination

1. Written Examination – 50 marks

2. Record Note Book – 10 marks

Passing Mark - No Minimum Marks for Internal Test

- Minimum 24 (out of 60 marks) for End Semester Examination

Eligibility for the Degree - Passing Minimum is 40% (both Internal &End Semester)

Examination Pattern for Core, Allied, Part IV and Certificate Courses to be implemented from the Academic Year 2021-2022

Allied Courses

Two Continuous Internal Assessment Tests (CIA) and One End Semester Examination (ESE) are conducted .The marks are distributed as follows:

Nature of Evaluation	CIA	ESE	Total
Theory	40	60	100
Practical	40	60	100

Continuous Internal Assessment Test (CIA) - UG

. The duration for the Internal Test is 1½ hours. Equal importance is given to all the units. The pattern of question paper for V and VI Semesters is as follows

Blue Print of the Question Paper (CIA) Maximum Marks: 30

Section	Type of Questions	No. of questions to be asked	No. of questions to be answered	Marks for each question	Total Mark
A	Multiple Choice Questions	6	6	1	6
B	Paragraph Questions (Inbuilt Choice)	6	3	4	12
C	Essay Questions (Open Choice)	3	2	6	12
Total					30

Components for Continuous Internal Assessment Tests are:

1. Two internal assessment tests is conducted for 30 marks each

   (The average marks of the two internal assessment tests will be taken ((**30 + 30/ 2)** = 30)

2. Two Assignments to be submitted for 5 marks each

   (The average of two assignments is taken for 5 marks)

3. Seminar / Quiz / Group Discussion – 5 marks

   (If Quiz is conducted, the average of two quizzes is taken for 5 marks)

4. Third test may be allowed for absentees of anyone of the two assessments for genuine reasons.

End Semester Examination (ESE)

Duration of the End Semester Examination is 2 Hours. Equal importance is given to all the units. The pattern of Question Paper for the End Semester Examination is as follows:

Blue Print of the Question Paper(UG) **Maximum Marks: 60**

Section	**Type of Questions**	**No. of questions to be asked**	**No. of questions to be answered**	**Marks for each question**	**Total Mark**
A	Multiple Choice Questions	10	10	1	10
B	Paragraph Questions (Inbuilt Choice)	10	5	4	20
C	Essay type Questions (Open Choice)	5	3	10	30
	Total				60

Evaluation Pattern for Pass in Under Graduate

1. Passing minimum is 35% in end semester examination, i.e. 21 out of 60 to be taken as pass mark for UG students.
2. There is no minimum pass mark for internal tests.
3. An aggregate of 40 marks for UG (sum of Continuous Internal Assessment and End Semester Examination) is required to pass.

Part IV Courses

Regarding Part IV Courses, such as Skill Based, Non Major Elective, Value Education and Environment & Gender Studies - Two Continuous Internal Assessment Tests (CIA) and One End Semester Examination (ESE) are conducted. The marks are distributed as follows:

Nature of Study	CIA	ESE	Total
Theory	20	30	50
Practical	20	30	50

Continuous Internal Assessment Test (CIA) - UG

The duration for the internal test is 1 hour. Equal importance is given to all the units. The pattern of question paper for Continuous Internal Assessment Test (CIAT) is as follows:

Blue Print of the Question Paper (CIA) **Maximum Marks: 15**

Section	Type of Questions	No. of questions to be asked	No. of questions to be answered	Marks for each question	Total Mark
A	Paragraph Questions	5	5	2	10
B	Essay type Questions (open choice)	2	1	5	5
Total					15

Components for Continuous Internal Assessment

1. Two internal tests are conducted for 15 marks each
   (The average of the marks of two internal assessments will be taken ((**15+15) / 2)** = 15)
2. One Assignment is to be submitted for 5 marks.

End Semester Examinations (ESE)

Duration of the End Semester Examination is 2 Hours. Equal importance is given to all the units. The pattern of Question Paper for the End Semester Examination is as follows:

Blue Print of the Question Paper (UG) **Maximum Marks: 30**

Section	**Types of Questions**	**No. of questions to be asked**	**No. of questions to be answered**	**Marks for each question**	**Total Mark**
A	Paragraph Questions	5	5	3	15
B	Essay Type Questions (open choice)	5	3	5	15
Total					30

Evaluation Pattern for Under Graduate

1. Passing minimum is 35% in end semester examination, i.e. 11 out of 30 will be taken as pass mark for UG students.
2. There is no minimum pass for internal tests.
3. An aggregate of 40 marks (sum of Continuous Internal Assessment Test and End Semester Examination) is required to pass.

<u>Certificate Courses</u>

Regarding Extra Credit Certificate Courses, the study material will be prepared by the course teacher. One Internal Assessment Test and the End Semester Examination will be conducted for 20 **marks and 30 marks respectively.** Evaluation will be made by the course teacher. The marks are distributed as follows:

Nature of Study	IA	ESE	Total
Theory	20	30	50
Practical	20	30	50

Internal Assessment Test (IA)

The duration for the internal test is 1 hour. Equal importance is given to all the units. The pattern of question paper is as follows:

Blue Print of the Question Paper **Maximum Marks: 15**

Section	Types of Questions	No. of questions to be asked	No. of questions to be answered	Marks for each question	Total Mark
A	Paragraph Questions	5	5	2	10
B	Essay type Questions (open choice)	2	1	5	5
Total					15

Components for Internal Assessment Test

1. One internal test is conducted for 15 marks
2. One Assignment is to be submitted for 5 marks.

End Semester Examination (ESE)

Duration of the End Semester Examination is 2hours**.** Equal importance is given to all the units. The pattern of Question Paper is as follows:

Blue Print of the Question Paper **Maximum Marks: 30**

Section	Type of Questions	No. of question to be asked	No. of questions to be answered	Marks for each question	Total Mark

A	Paragraph Questions	5	5	3	15
B	Essay Type Questions (open choice)	5	3	5	15
Total					30

Evaluation Pattern for Under Graduate

1. Passing minimum is 35% in end semester examination, i.e. 11 out of 30 will be taken as pass mark for UG students.
2. There is no minimum pass for internal test.
3. An aggregate of 40 marks (sum of Internal Assessment Test and End Semester Examination) is required to pass the Course.