SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]
[Accredited by NAAC with 'A' Grade with CGPA of 3.27]
[Recognized 2(f) & 12(B) Status under UGC Act of 1956]
Katteri – 636 902, Uthangarai (Tk), Krishnagiri (Dt)
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DEGREE OF BACHELOR OF SCIENCE IN BOTANY

CHOICE BASED CREDIT SYSTEM (CBCS)

REGULATIONS AND SYLLABUS FOR

B.Sc. BOTANY PROGRAMME

(SEMESTER PATTERN)

(For Students Admitted in the College from the
(Academic Year 2021-2022 Onwards)

Programme Outcomes (POs)

PO1	The study of botany will provide a good knowledge about Microbiology, Phycology, Taxonomy, Molecular Biology, Medicinal plants, Plant Tissue Culture and Ecological distributions.
PO2	Acquire tremendous opening to enhance the plant science knowledge on Plant Diversity and ecological dimension of vascular cryptogams and Angiosperms and to study the plant kingdom.
PO3	Gain knowledge and understand the range of plant diversity in terms of structure, function and environmental relationship from primitive to highly evolved plant groups.
PO4	Gather knowledge on various physiological and biochemical pathways and their vital role in biotic factors.
PO5	Apply logical information on the significance of moral natural standards and resulting duties applicable to biodiversity protection, practical and manageable utilization of plants.
PO6	Students can reveal the medicinal properties of plants in the socioeconomic values of identified plant sciences and to spread information on different parts of therapeutic plants and proper contemplations on human health issues.
PO7	Information on conservation of plant resources and different hotspots expand studies to investigate their helpful qualities economically, socially and aesthetically.
PO8	Use look into research based information and research techniques including the lab experiments, analysis and data prediction, information, and advancement of the data to provide a substantial ends.

Programme Specific Outcomes (PSOs)

PSO1	Through scientific classification, the students understand about the plant communities and binomial names, economic significance including the utilizations and varieties among several types of Angiosperms.
PSO2	Students can apply the knowledge and relate the information gained from the allied subjects viz; Zoology and Chemistry, to explain and conclude through the interdisciplinary approaches.
PSO3	The students enhance knowledge on the pathways of metabolisms, transport and translocation of water and solutes and biochemical parameters like carbohydrate, protein and lipid together with a better understanding of regulation of growth, development and influence of environment.
PSO4	The students will have the option to secure tremendous academic information on the science of fossils and living plants alongside their associations with their condition in the environment.
PSO5	Investigation of horticulture and arranging procedures helps to the students to execute information on the procedure of development of nurseries and the management and maintenance of the gardens.

SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

Bachelor of Science (B.Sc.) in Botany

Programme Pattern and Syllabus – CBCS

(For Students Admitted in the College from the Academic Year 2021-2022 Onwards)

Sl. No.	Part	Nature of Course	Course Code	Name of the Course	Hours/ Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER I									
1	I	Language	21UTA1F01	Tamil – I	5	3	25	75	100
2	II	Language	21UEN1CE01	Communicative English – I	5	3	25	75	100
3	III	Core – I	21UBO1C01	Plant Diversity – I (Algae, Fungi, & Lichens)	5	5	25	75	100
4		Core Practical – I Extended to Semester II	21UBO2P01	Practical – I	3	Credit and marks are carried to Core Practical – I of Semester II			
5		Allied – I	21UZO1A01	Allied Zoology – I	5	4	25	75	100
6		Allied Practical – I Extended to Semester II	21UZO2AP01	Allied Zoology Practical – I	3	Credit and marks are carried to Allied Practical – I of Semester II			
7	IV	Add on course - I	21ULS1AAO01	Professional English – I	2	**4**	**25**	**75**	**100**
8	V	Value Education	21UVE101	Yoga	2	2	25	75	100
Total					**30**	**21**	**150**	**450**	**600**
SEMESTER II									
9	I	Language	21UTA2F02	Tamil – II	5	3	25	75	100
10	II	Language	21UEN2CE02	Communicative English – II	5	3	25	75	100
11	III	Core – II	21UBO2C02	Plant Diversity – II (Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)	5	5	25	75	100
12		Core Practical – I Extended from Semester I	21UBO2P01	Practical – I (Algae, Fungi, Lichens,	3	3	40	60	100

				Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)					
13		Allied – II	21UZO2A02	Allied Zoology – II	4	4	25	75	100
14		Allied Practical – I Extended from Semester I	21UZO2AP01	Allied Zoology Practical – I	3	3	40	60	100
15	IV	Add on Course – II	21ULS2AO02	Professional English – II	2	4	25	75	100
16	V	SBEC – I	21UBO2S01	Mushroom Culture Technology	2	2	25	75	100
17		Common Paper	21UES201	Environmental Studies	1	2	25	75	100
Total					**30**	**29**	**255**	**450**	**900**
SEMESTER III									
16	I	Language	20UTA3F03	General Tamil –III	5	3	25	75	100
17	II	Language	20UEN3F03	General English – III	5	3	25	75	100
18	III	Core – III	20UBO3C03	Anatomy of Angiosperms, Embryology of Angiosperms and Plant Microtechniques	5	4	25	75	100
19		Core Practical – II Extended to Semester IV	20UBO4P02	Practical – II	3	Credit and marks are carried to Core Practical – II of Semester IV			
20		Allied – III	20UCH3A01	Allied Chemistry – I	5	4	25	75	100
21		Allied Practical – II Extended to Semester IV	20UCH4AP01	Allied Chemistry Practical – I	3	Credit and marks are carried to Allied Practical – II of Semester IV			
22	IV	SBEC – II	200UBO3S02	Horticulture	2	2	25	75	100
23		NMEC-I		Non-Major Elective – I	2	2	25	75	100
Total					**30**	**18**	**150**	**450**	**600**
SEMESTER IV									
24	I	Language	20UTA4F04	General Tamil – IV	5	3	25	75	100
25	II	Language	20UEN4F04	General English –	5	3	25	75	100

				IV					
26	III	Core Course – IV	20UBO4C04	Cell and Molecular Biology	5	4	25	75	100
27		Core Practical – II Extended from Semester III	20UBO4P02	Practical – II Anatomy of Angiosperms, Embryology of Angiosperms, Plant Microtechniques, Cell and Molecular Biology	3	3	40	60	100
28		Allied – IV	20UCH4A02	Allied Chemistry – II	5	3	25	75	100
29		Allied Practical – II Extended from Semester IV	20UCH4AP01	Allied Chemistry Practical – I	3	3	40	60	100
30	IV	SBEC – III	20UBO4S03	Plant Tissue Culture	2	2	25	75	100
31		NMEC-II		Non-Major Elective – II	2	2	25	75	100
Total					**30**	**23**	**230**	**570**	**800**
SEMESTER V									
32	III	Core Course – V	20UBO5C05	Plant Morphology, Taxonomy and Economic Botany of Angiosperms	5	5	25	75	100
33		Core Course – VI	20UBO5C06	Genetics, Plant Breeding and Evolution	5	5	25	75	100
34		Core Course – VII	20UBO5C07	Bioinstrumentation and Biostatistics	5	5	25	75	100
35		Core Practical – III Extended to Semester VI	20UBOP603	Practical – III	6	Credit and marks are carried to Core Practical – III of Semester VI			
36		Major Elective – I	20UBO5E01	Plant Biotechnology	5	5	25	75	100
37	IV	SBEC – IV	20UBO5S04	Medico Ethno Botany	2	2	25	75	100
38		SBEC – V	20UBO5S05	Seed Technology	2	2	25	75	100
Total					**30**	**24**	**150**	**450**	**600**

SEMESTER VI									
39	III	Core Course – VIII	20UBO6C08	Plant Physiology, Biochemistry and Biophysics	5	5	25	75	100
40		Core Course – IX	20UBO6C09	Ecology, Phytogeography and Resource Conservation	5	5	25	75	100
41		Core Course – X	20UBO6C10	Microbiology and Plant Pathology	5	5	25	75	100
42		Core Practical – III Extended from Semester V	20UBOP603	Practical – III Plant Morphology, Taxonomy, Economic Botany of Angiosperms, Genetics, Plant Breeding, Evolution Bioinstrumentation and Biostatistics	3	4	40	60	100
43		Core Practical – IV	20UBO6P04	Practical – IV Plant Physiology, Biochemistry Biophysics Ecology, Phytogeography Resource Conservation Microbiology and Plant Pathology	3	4	40	60	100
44		Major Elective – II (Any One)	20UBO6E02	Forestry	5	5	25	75	100
			20UBO6E03	Food and Nutrition					
45	IV	SBEC – VI	20UBO6S06	Algal Biotechnology	2	2	25	75	100
46		SBEC – VII	20UBO6S07	Nursery and Gardening	2	2	25	75	100
47	VI			Extension Activities		1			
Total					**30**	**33**	**230**	**570**	**800**
Grand Total					**180**	**148**	**1165**	**3135**	**4300**

Note:

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

SWAYAM –Study Webs of Active-Learning for Young Aspiring Minds

NPTEL –National Programme on Technology Enhanced Learning

Major Elective Courses

1. Plant Biotechnology
2. Forestry
3. Food and Nutrition

Non-Major Elective Courses

1. Mushroom Cultivation
2. Home Gardening

List of Extension Activities

1. National Cade Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

PROGRAMME SYLLABUS

Program: B.Sc. Botany				
Core – I	**Course Code:** 21UBO1C01		**Course Title:** Plant Diversity – I (Algae, Fungi and Lichens)	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	5	75	5	100

Course Objectives

1. To enhance the knowledge on Primitive plants and to know about the diversity distributions of the primitive life of the lower plants.
2. To understand the distribution, structure, reproduction and life cycle patterns of lower life forms.
3. To know the economic importance of lower plants.

SYLLABUS

UNIT - I

Algae: Introduction and general characters; detailed study of habits, habitats and distribution of algae, outline classification of algae by Fritsch (1945). Detailed study of occurrence, thallus structure, reproduction and life cycle of Cyanophyceae – *Nostoc*, Chlorophyceae – *Caulerpa* and Charophyceae – *Chara*.

UNIT - II

Detailed study of occurrence, thallus structure, reproduction and life cycle of Bacillariophyceae - *Cyclotella*; Phaeophyceae - *Sargassum;* Rhodophyceae - *Gracilaria.* Algae in environment, agriculture and industry.

UNIT - III

Fungi: General characters, structure and reproduction of fungi. Outline classification of fungi by Alexopoulos and Mims (1979). Detailed study of occurrence, structure, reproduction and life cycle of Oomycetes – *Albugo* and Zygomycetes - *Pilobolous*.

UNIT - IV

Detailed study of occurrence, structure, reproduction and life cycle of Ascomycetes - *Peziza, Saccharomyces*; Basidiomycetes – *Puccinia*; Deuteromycetes – *Cercospora.* Economic importance of Fungi.

UNIT - V

Lichen: General characteristics, thallus organization (*Usnea*), types, reproduction. Economic and ecological importance of Lichens.

Text Books

1. Bilgrami K. S. (2015). A Text book Of Algae. CBS Publication.
2. Bold, H.C. and Wynne, M.J. (1985). Introduction to the Algae. Prentice Hall of India, New Delhi.
3. Dharani Dhar Awasthi (2000). A Handbook of Lichens Vedams Books (P) Ltd. New Delhi.
4. Dube, H.C. (1983). Introduction of Modern Mycology. Blackwell Science Publication. Oxford.
5. Dube, H.C. (1990). An Introduction of Fungi. Vikas Publication House Ltd, New Delhi.
6. Fritsch, F.E. (1945). Structure and reproduction of Algae. Cambridge University press, New York.
7. Kumar, H.D. (1999). Introductory Phycology. 2nd Edition. Affiliated East-West. Press Pvt. Ltd. New Delhi.
8. Lee, R.D. (2008). Phycology 4th Edition, Cambridge University Press, New York
9. Pandey, B.P. (1994). Algae.S. Chand & Company Ltd. New Delhi.
10. Round, FE. (1984). The Ecology of Algae. Cambridge University Press, New York.
11. Sharma, O.P. (2011). Algae, Tata McGraw Hill Education Private limited, New Delhi.
12. Sharma, O.P. (2011). Fungi and allied microbes The McGraw –Hill companies, New Delhi.
13. Sharma, P.D. (2003). The Fungi. Rastogi Publications, Meerut, New Delhi.
14. Vashishta, B.R., Sinha, A.K. and Singh, V.P. (2011). Botany for Degree Students Algae, S. Chand. Pub. New Delhi.

Reference Books

1. Alexopoulus, C.J. and Mims, C.W. (1979). Introductory Mycology. Wiley Eastern ltd., New Delhi.
2. Bessey, E.A. (1979). Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.
3. Bold, H.C. and Wynne, M.J. (1985). Introduction to the Algae. Prentice Hall of India, New Delhi.

4. Burnett, J.H. (1971). The fundamentals of Mycology. ELBS Publication, London.
5. Fritsch, F.E. (1945). Structure and reproduction of Algae. Cambridge University press.
6. Hale, M.E. (1983). The Biology of Lichens. Edward Arnold, London.
7. Lee, R.D. (2008). Phycology 4th Edition, Cambridge University Press, New York.
8. Mehrotra, R.S. and Aneja, K.R. (1990). An Introduction to Mycology, New Age International Pub, New Delhi.
9. Muthukumar, S. and Tarar, J.L. (2006). Lichen Flora of Central India, Eastern book Corporation , New Delhi.
10. Nash, T.H. (1996). Lichen Biology. Cambridge University Press, London.
11. Round, F.E. (1984). The Ecology of Algae. Cambridge University Press.
12. Sundararajan, S. (2004). Practical manual of fungi, Anmol publications Pvt.ltd New Delhi.
13. Webster, J. (1970). Introduction to Fungi , Cambridge university press, London.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate and identify the algal species using algal pigments.	K1
CO2	Know about the distribution and mode of nutrition on fungal species.	K2
CO3	Apply knowledge on lichen as indicators of pollution.	K3
CO4	Enlarge the knowledge of Lichen and its functions.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
Add on Course – I	**Course Code:** 21ULS1APE01		**Course Title:** Professional English	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	2	75	4	100

Course Objectives

1. To develop the language skills of students by offering adequate practice in professional contexts.
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
3. To focus on developing students' knowledge of domain specific registers and the required language skills.
4. To develop strategic competence that will help in efficient communication
5. To sharpen students' critical thinking skills and make students culturally aware of the target situation.

SYLLABUS

UNIT 1: COMMUNICATION

Listening: Listening to audio text and answering questions - Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning-

Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition - Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming. (Mind mapping).

Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations

Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading : Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence,

Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Recognise their own ability to improve their own competence in using the language	K1
CO2	Use language for speaking with confidence in an intelligible and acceptable manner. Understand the importance of reading for life	K2
CO3	Read independently unfamiliar texts with comprehension. Understand the importance of writing in academic life	K3
CO4	Write simple sentences without committing error of spelling or Grammar	K3

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

NB: All four skills are taught based on texts/passages.

K1– Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
Core – II	**Course Code:** 21UBO2C02		**Course Title:** Plant Diversity – II (Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	5	75	5	100

Course Objectives

1. To know about the diversity of Cryptogams and Phanerogams.
2. To understand the life cycle pattern of Bryophytes, Pteridophytes and Gymnosperms.
3. To study the fossil remains of plants belonging to various eras of Paleobotany.

UNIT – I

Bryophytes: Introduction and general characters of Bryophytes. Classification of Bryophytes (Smith, 1955). A detailed study of occurrence, structure, reproduction and life cycle of *Marchantia, Anthoceros* and *Funaria*. Economic importance of Bryophytes.

UNIT – II

Pteridophytes: Introduction and general characters of Pteridophytes. Classification of Pteridophytes (Riemer, 1954). Sporangial organization – Homospory, Heterospory, Apogamy and Apospory. Vascular organization and Stelar evolution in Pteridophytes.

UNIT – III

A detailed study of occurrence, structure, reproduction and life cycle of *Selaginella, Equisetum, Marselia* and *Adiantum.* Economic importance of Pteridophytes.

UNIT – IV

Gymnosperms: Introduction and general characters of Gymnosperms. Classification of Gymnosperms (Sporne, 1965). Detailed study of occurrence, structure, reproduction and life cycle of *Cycas, Pinus* and *Gnetum.* Economic and ecological importance of Gymnosperms.

UNIT – V

Paleobotany: Introduction, Geological time scale, Paleobotany in India. Fossilization process and types. Radiocarbon dating. Study of the following fossils – *Rhynia, Lepidodendron* and *Williamsonia*.

Text Books

1. Pandey, B.P. (1994). A Text book of Botany - Pteridophyta. Chand & Co. New Delhi.
2. Gangulee, Das, and Kar. (2001). College Botany Vol II. New central Book agency Pvt. Ltd. Calcutta.
3. Pandey, B.P. (1981). Gymnosperms. Chand & Co., New Delhi.
4. Sambamurty, A.V.S.S. (2006). A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. IK International Publishing House, New Delhi, India
5. Shukla and Mishra. (1982). Essentials of Paleobotany. Vikas Publishing House, Pvt Ltd., New Delhi.
6. Vashista, P.C. (1992). Pteriodophyta. Chand & Co., New Delhi.
7. Vashista, P.C., Sinha and Anil Kumar. (2008). Text book of Bryophytes. Chand &Co., New Delhi.

Reference Books

1. Rashid. (1995). An introduction to Pteridophytes. Vikas Publishing House, Pvt. Ltd., New Delhi.
2. Smith, G.M. (1955). Cryptogamic Botany Vol. II. Tata McGraw Hill Publications, New Delhi.
3. Sporne, K.R. (1980). Morphology of Petridophytes -B.I. Publications, New Delhi.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Explore the knowledge on Plant diversity i.e. Bryophytes, Pteridophytes and Gymnosperms.	K1
CO2	To understand the internal structure and reproduction of Cryptogams and Phanerogams.	K2
CO3	Apply the medicinal and economic knowledge of Bryophytes, Pteridophytes and Gymnosperms for the benefit of human welfare.	K3
CO4	Apply the knowledge on earlier period evidences of fossils for the identification and also to establish the age of the fossil plants through radiocarbon dating.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
SBEC – I	**Course Code:** 21UBO2S01		**Course Title:** Mushroom Cultivation Technology	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	2	30	2	100

COURSE OBJECTIVES

1. To acquire knowledge of on the mushroom culture.
2. To understand the importance of mushrooms.
3. To learn the methodology involved in mushroom cultivation.
4. To know the various recipes preparation.

UNIT – I

Introduction to mushroom cultivation: General characters, structure and reproduction of mushrooms – Identification of mushrooms – Types of mushroom – Poisonous mushroom.

UNIT – II

Uses of mushroom: Nutritive, food and Medicinal value.

UNIT III

Mushroom culture techniques: Mushroom sheds construction – Spawn preparation – Medium preparation – Spawn running – Incubation – Cultivation methods for button and oyster mushrooms – Disease and control measures.

UNIT IV

Post harvest operations: Harvesting – Storage and preservation – Spoilage of mushrooms – Packing – Marketing.

UNIT V

Mushroom recipes: Mushroom soup – Sandwich – Gravy – Omelette – Mushroom chilly manchurian and briyani.

Text Books

1. Suman, B.C and Sharma, V.P. (2007) Mushroom Cultivation in India. Daya Publishing House. New Delhi.

2. Gogoi, R., Rathaiah, Y and Borah, T.R. (2006). Mushroom Cultivation Technology. Scientific Publishers. Jodhpur, Rajasthan.
3. Kanniyan, (1980). Text book of Mushroom, Today and Tomorrow publishers, Chennai.
4. Nita bahl, (1988). Hand book of mushrooms, Vol. II, IBH publishers, New Delhi.
5. Subrata Biswas, Datta, M., Ngachan, S.V. (2011) Mushrooms: A Manual For Cultivation. PHI Learning, New Delhi.

Reference Books

1. Chang S.T. and N.A.Hayer, 2002. The biology and cultivation of edible mushrooms.
2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Manjit Singh, Bhuvnesh Vijay, Shwet Kamal and Wakchaure, C.G. (2011). Mushrooms - cultivation, marketing and consumption. Directorate of Mushroom research, ICAR, Chambaghat, Solan, HP.
4. Pathak, V.N., Yadav, N. and Gour, M., 2000. Mushroom production and processing technology, Agrobios Ltd., Jodhpur, India.
5. Reeti Singh and U.C. Singh, (2005). Modern Mushroom cultivation, Agrobios (India) Ltd.
6. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., Bangalore.
7. Tewari and Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge on mushrooms to differentiate edible from poisonous.	K1
CO2	Understand the mushroom cultivation.	K2
CO3	Apply knowledge on cultivation of the mushroom using techniques.	K3
CO4	Impart interest on preparation of mushroom recipes.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

8.

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
Skill Based Course – II	**Course Code:** 21ULS2APE02	**Course Title:** Professional English – II		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	2	45	4	100

Objectives

1. The Professional Communication Skills Course is intended to help Learners in Arts and Science colleges, Develop their competence in the use of English with particular reference to the workplace situation.
2. Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace.
3. Develop their competence and competitiveness and thereby improve their employability skills.
4. Help students with a research bent of mind develop their skills in writing reports and research proposals.

Unit 1- Communicative Competence

Listening – Listening to two talks/lectures by specialists on selected subject

Specific topics - (TED Talks) and answering comprehension exercises (inferential questions)

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages.

Unit 2 - Persuasive Communication (18 hours)

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication

Speaking: debates – Just-A Minute Activities

Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay.

Unit 3 - Digital Competence

Listening to interviews (subject related)

Speaking: Interviews with subject specialists (using video conferencing skills)

Creating Vlogs (How to become a vlogger and use vlogging to nurture interests – subject related)

Reading: Selected sample of Web Page (subject area)

Writing: Creating Web Pages

Reading Comprehension: Essay on Digital Competence for Academic and Professional Life. The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area

Unit 4 - Creativity and Imagination

Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/other MOOC videos on Indian academic sites – E.g. https://www.youtube.com/watch?v=tpvicScuDy0)

Speaking: Making oral presentations through short films – subject based

Reading : Essay on Creativity and Imagination (subject based)

Writing – Basic Script Writing for short films (subject based) - Creating blogs, flyers and brochures (subject based) - Poster making – writing slogans/captions (subject based)

Unit 5 - Workplace Communication & Basics of Academic Writing

Speaking: Short academic presentation using PowerPoint

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting.

Writing an introduction, paraphrasing Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis) Capitalization (use of upper case)

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Attend interviews with boldness and confidence.	K1
CO2	Adapt easily into the workplace context, having become communicatively competent.	K2
CO3	Apply to the Research & Development organisations/ sections in companies and offices with winning proposals.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

9.

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
Core Practical – I	**Course Code:** 21UBO2P01		**Course Title:** Plant Diversity – I & II (Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	3	45	3	100

COURSE OBJECTIVES

- To enable students to know about the diversity of lower organisms.
- To understand the life cycle pattern of Bryophytes, Pteridophytes and Gymnosperms.
- To study the fossil remains of plants in the division of Paleobotany.

Algae: Micro preparation and detailed microscopic analysis of vegetative and reproductive parts of the following Algae - Nostoc, Caulerpa, Chara, Cyclotella, Sargassum and Gracillaria. Study the Economic importance of Algae (Spotters - Agar-agar, Carrageenan, SCP (Spirulina) – Chlorellin (Antibiotic), Fodder (Sargassum) – Diatomite.

Fungi: Albugo, Pilobolous, Peziza, Saccharomyces, Puccinia and Cercospora (Spotter - Penicillium and Pleurotus ostreatus)

Lichen: *Lichen* and its types

Bryophytes: Micro preparation and detailed microscopic analysis of vegetative and reproductive parts the following Bryophytes – Marchantia, Anthoceros and Funaria.

Pteridophytes: Study of the Habit, TS of leaf and Stem, Morphology of Reproductive structures of Following Pteridophytes - Selaginella, Equisetum, Marsilea and Adiantum.

Gymnosperm: Study of the Habit, TS of leaf and stem, Morphology of Reproductive structures of following gymnosperm genera Cycas, Pinus and Gnetum.

Paleobotany: Study the following fossil members, Rhynia, Lepidodendron and Williamsonia, through permanent slides.

***Bonafide record of practical work done should be submitted for the practical examination.**

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate the lower forms and advanced Thallophytes and its vegetative and reproductive parts.	K3
CO2	Analyze the internal organization of Cryptogams and Phanerogams.	K4
CO3	Evaluate and assess different fossil plant through permanent slides.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S

S - Strong H - High M - Medium L – Low

SRI VIDYA MANDIR ARTS AND SCIENCE COLLEGE (Autonomous)

KATTERI – 636 902

UG MODEL PRACTICAL QUESTION PAPER

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2021-22 onwards)

Core Practical: I (COVERING PLANT DIVERSITY - I & II)

(Algae, Fungi, Lichen, Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)

Time: 3 Hours

Max. Marks: 60 Marks
Practical: 50 Marks
Record : 05 Marks
Viva voce: 05 Marks

BREAK UP OF MARKS

1. Take transverse section of A, B, C, D and E Stain and mount in glycerin. Identify giving a reason. Draw diagrams. Leave the slides for valuation. (20)
2. Draw diagrams and write notes of interest on F, G, H, I & J (15)
3. Name the genus, group and morphology of given part of K, L and M. (Diagrams not necessary) (9)
4. Identify and write notes on the economic importance of N, O & P. (6)

KEY

(Algae, Fungi, Lichen, Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)

A, B, C, D and E - Sectioning of materials from PD-1 & PD-II.

(A - Algae, B- Fungi, C- Bryophytes, D- Pteridophytes and E- Gymnosperms)

(Thallus, Rachis, and Reproductive part)

(Preparation – 2, Identification -1, and Reason -1) (5x4=20 Marks)

F, G, H, I & J (Slides, spotters, Specimen, Photo cards, etc from PD-1 & PD-II)

(F - Algae, G- Fungi/Lichen, H- Bryophytes, I- Pteridophytes and J-Gymnosperms/Paleobotany)

(Thallus, Internal structure, Rachis, and Reproductive part)

(Identification -1, Reason -2) (5x3=15 Marks)

K, L, and M - Genus (1), Group (1) and Morphology (1)

(Algae/Fungi/Bryophytes/Pteridophytes/Gymnosperms (3x3=9 Marks)

N, O, & P = Economic importance

(Algae/Fungi/Lichen/Bryophytes/Pteridophytes/Gymnosperms)

(Identification -1; Reason -1) (3x2=6 Marks)

Program: B.Sc. Botany				
Core – III	**Course Code:** 21UBO3C03		**Course Title:** Anatomy of Angiosperms, Embryology of Angiosperms and Plant Microtechniques	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	5	75	5	100

COURSE OBJECTIVES

1. To inculcate knowledge on the basics of tissues and anatomical features of plants.
2. To understand the key aspects of reproductive systems of flowering plants.
3. To know the methods of plant specimen preparation for histological studies.

UNIT – I

Anatomy of angiosperms: Scope and significance of plant anatomy. Meristem – Origin and Classification. Shoot apex and Root apex – theories (Apical, Histogen and Tunica-corpus theory). Epidermal tissue system: Stomata – types and functions. Trichomes – Types and functions, structure.

UNIT – II

Simple permanent tissues: Parenchyma, Collenchyma, Sclerenchyma (Fibers and Sclereids). Complex tissues: Xylem and Phloem. Annual rings, Heart wood and Sap wood. Primary and secondary structure of Dicot and Monocot of stem and root. Anomalous secondary growth in stems of *Nyctanthes* and *Dracaena*. Structure of Dicot and Monocot leaf. Nodal anatomy – Uni, tri and multilacunar node.

UNIT – III

Embryology of angiosperms: Structure of mature anther and ovule. Microsporangium: Structure and development of anther, Tapetum – structure, types and functions, Pollen morphology - NPC formula, pollen wall features. Megasporangium: Structure, types of ovule, ultrastructure of mature Embryosac (*Polygonum type*).

UNIT – IV

A brief account on pollination, Fertilization (double fertilization and triple fusion). Structure, types and functions of endosperm. Structure and development of dicot embryo (*Capsella bursa-pastoris*), Polyembryony.

UNIT – V

Microtechniques – Detail study of Light Microscope – Brief outline of Killing and fixation – Dehydration (butyl alcohol method), clearing (Xylol) and Infiltration (Paraffin wax method) – Embedding (wax) – Types of sectioning Microtome – importance and its types Staining – single and double staining (Safranin-Fast Green) – Mounting (DPX).

Text Books

1. Crang, R., Lyons-Sobaski, S and Wise, R. (2018) Plant Anatomy: A Concept-Based Approach to the Structure of Seed Plants. Springer International Publishing.
2. Esau.K. (1985). Anatomy of Seed Plants. 2nd Edn. John Wiley and Sons, New York.
3. Fahn, A. (1982). Plant Anatomy. (3rd edition). Pergamon Press, Oxford.
4. Maheswari, P. (1950). Introduction to the embryology of Angiosperms. Vikas Publishing House, New Delhi.
5. Pandey, B.P. (1978). Plant Anatomy. Chand and Co, New Delhi.
6. Raghavan, V. (1997). Molecular Embryology of Flowering Plants. Cambridge University Press, Cambridge.
7. Bhojwani, S. S. and Bhatnagar, S. P. (1985). Embryology of Angiosperms, Vikas Publishing House, Noida.
8. Singh, Pandey and Jain. (2007). Anatomy of Seed plants, Rastogi Publications. New Delhi
9. Annie Regland. (2000). Developmental Botany -Saras Publication, Kanyakumari.

Reference Books

1. Dwivedi, J.N. (1988). Embryology of Angiosperms. Rastogi & Co., Meerut.
2. Esau, K. (1991). Plant Anatomy. Wiley Eastern Ltd. New Delhi. 7th Edition.
3. Fahn, A (1985). Plant Anatomy. Pergamon Press, Great Britain.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Know about the various developmental aspects of the plants.	K1
CO2	Compare and identify the structural differences existing among the vascular plants.	K2
CO3	Imply the embryological and anatomical knowledge to differentiate the plant taxa.	K3
CO4	Familiarize the basic skills on fixation, dehydration, infiltration and staining process of the specimens.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
SBEC – II	**Course Code:** 21UBO3S02		**Course Title:** Horticulture	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	2	30	2	100

Course Objectives

1. To learn about the propagation methods of horticultural crops.
2. To study the various types of gardening, landscaping and their management.
3. To know about commercial floriculture and their significance.

UNIT – I

Scope and divisions of Horticulture - methods of vegetative propagation - cutting, layering and grafting - organic manures - fertilizers - irrigation.

UNIT – II

Gardening : Types of gardens, Indoor garden, Kitchen garden and Public garden. Important ornamentals - habit and types - garden components - lawn making, glass house, rockery, water garden, hydroponics and aeroponics, terrace gardening, topiary and Terrarium.

UNIT – III

Production technology - Cultivation of vegetables - Brinjal, Tomato and Onion. Cultivation of fruits - Banana, Mango and Apple - growth regulators in horticulture. Plant protection measures for horticulture.

UNIT – IV

Cultivation of flowers - Jasmine, Rose, Orchid, Anthurium. Cultivation of plantation crops - Tea, Coffee and Cardamom - Cultivation of medicinal plants - Periwinkle, Aloe and Gloriosa.

UNIT – V

Extraction of Jasmine concrete and Papain; Bonsai. Flower arrangement - Cut flowers and its importance; methods to prolong cut flowers life - Preservation of fruits and vegetables.

Text Books

1. Chatopadhya, S.K. (2018). Commercial Floriculture. Gene Tech Books. New Delhi.
2. Manibhusan Rao. (2012). Textbook of Horticulture. Vishvanathan & Co. Chennai.
3. Trivedi, P. (2015). Home Gardening. Narosa Publication. New Delhi.

Reference Books

1. Bhattacharya. S.K. (2007). Vistas in Horticulture. Gene Tech Books. New Delhi.
2. Choudhury. (2012). Vegetables. Narosa Publication. New Delhi.
3. Gelhot. D. (2017). Organic Farming. J.V. Public. House. Jodhpur.
4. Kumar. N. (2017) An introduction to Horticulture. Narosa Publication. New Delhi.
5. Kumar. N. (2006). Introduction to Spices Plantation Crops Medicinal and Aromatic Plants Plant Breeding. Narosa Pub., New Delhi.
6. Mandal. R.C. (1990). Weed control. J.V. Publi. House. Jodhpur.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain knowledge on various horticultural practices.	K1
CO2	Understand solutions to cultivate a wide variety of plants through vegetative propagules.	K2
CO3	Develop bonsai plants using various techniques.	K3
CO4	Preserve food and vegetables using suitable techniques for the commercial uses throughout the year.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
Core – IV	**Course Code:** 21UBO4C04		**Course Title:** Cell and Molecular Biology	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	5	75	5	100

Course Objectives

1. To understand the basic knowledge about the cell and its structure.
2. To achieve knowledge on the frontiers of plant cell organelles.
3. To learn about cell genetic property and its function.
4. To know the cell division and its sequence.
5. To understand about gene expression.

UNIT – I

Cell theory. Prokaryotic and Eukaryotic cell. Ultrastructure of plant cell. Structure and organization of plant cell wall. Plasma membrane structure and models – function and its modifications. Plasmodesmata and solid transport between cells.

UNIT – II

Chloroplast – Structure, function and its significance. Mitochondria – Structure and functions; Ribosomes – Origin; Structure and functions; Structure and functions of Golgi apparatus, lysosomes, vacuoles, endoplasmic reticulum and peroxysomes.

UNIT – III

Chromosomes – Morphology, structure of polytene and lampbrush. Cell division and cell cycle – Phases of cell cycle, mitosis and meiosis: significance and its difference.

UNIT – IV

Central Dogma of molecular biology. DNA and RNA - structure and types. Nucleosomes. DNA replication – semi conservative model; transcription; Genetic code – properties; Protein synthesis - translation in Prokaryotic.

UNIT – V

Regulation of gene expression; one gene - one polypeptide hypothesis. Post-transcriptional and translational processing. Gene expression in Prokaryotes– Operon concept.

Text Books

1. Albert (2014). Molecular Biology of The Cell. Taylor & Francis publications.
2. Rastogi, S.C. (1992). Cell biology, Tata McGrew-Hill, New Delhi.
3. Sundararajan, S. (2000). Cytology, Anmol publication (P) Ltd. New Delhi.
4. Verma P.S. (2004). Cell Biology, Genetics, Molecular Biology, Evolution & Ecology. S.Chand & Co Publiction. New Delhi.

References Books

1. De Robertis and De Robertis (1990). Cell and Molecular Biology, Saunders College, Philadelphia, USA.
2. Elliott, W.H. and Elliott, D.C. (2005). Biochemistry and Molecular Biology, 3rd Ed. Oxford University, Oxford.
3. Freifelder, D. (1993). Essentials of Molecular Biology, Jones & Bartlett, Boston.
4. Geoffrey M. Cooper and Robert E. Hansman (2007). The cell - A Molecular approach, sinauer Associates. USA.
5. Gupta, P.K. (1999). A Text – book of Cell and Molecular Biology. Rastogi Publications, Meerut, India.
6. Hopkins, W. (1988). Molecular biology of the gene. Benjamin publishing Company. California.
7. Lee, P.J. (1999). Plant Biochemistry and Molecular Biology, 2nd edition. John Wiley and Sons, New York.
8. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. (2000). Molecular cell biology (4th Edition). W.H. Freeman and Co. New York, USA.
9. Watson, J.D. (1987). Molecular Biology of Gene. The Benjamin. Gummings publishing Co. inc. California.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the details about Plant cell, organelles, and their functions.	K1
CO2	Know about the Nucleic acids, DNA and RNA structures and its functions.	K2
CO3	Study the cell division and protein synthesis in plant sciences	K3
CO4	Apply the molecular biology techniques using micro organism models.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
SBEC – III	**Course Code:** 21UBO4S03		**Course Title:** Plant Tissue Culture	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	2	30	2	100

Course Objectives

1. To study the basic and advanced developments in the field of Plant tissue culture.
2. To equip students with theoretical knowledge regarding the techniques and applications of plant tissue culture and Micro propagation.
3. To help students to get a career in Industry/R &D/Academic.

UNIT – I

Plant tissue culture: Introduction and milestones. Laboratory organization. Lab tools required. Media preparation. Sterilization techniques.

UNIT – II

Explant – Selection and sterilization. Types of culture. Micropropagation – Direct and Indirect. Somaclonal variation. Suspension culture.

UNIT – III

Haploid culture – Anther culture, pollen culture and ovary culture. Triploid production. protoplast - Isolation, culture, purification and fusion.

UNIT – IV

Somatic Hybridization. Somatic Embryogenesis. Artificial seed production. Germplasm preservation.

UNIT – V

Application of tissue culture in Horticulture. Transgenic plants. Production of herbicide resistance, pest resistance and salt tolerant plants. Conservation of endangered and rare species. Production of secondary metabolites.

Text Books

1. Dubey, R.C. (2001). A text book of biotechnology. S.Chand & Co Publication, New Delhi.

2. Gupta, P.K. (1994). Elements of Biotechnology. Rastogi Publications, Meerut.
3. Ignacimuthu, S.J. (2003). Plant Biotechnology. Oxford & IBH Publishing, New Delhi.
4. John Jothi Prakash, E. (2005). Outlines of Plant Biotechnology. Emkay Publishers, New Delhi.
5. Kalyankumar De (2008). Plant tissue culture. New Central Book Agency, Calcutta.
6. Sathyanarayana, B.N. and Vergheese, D.B. (2007). Plant tissue culture - Practices and new experimental protocols, ILK Publ. New Delhi.

Reference Books

1. Bhojwani, S.S. and Razdan, M.K. (2004). Plant Tissue Culture, Read Elsevier India Pvt. Ltd.
2. Dix, P.J. (1990). Plant cell line and selection. VCH Publ. Cambridge, U.K.
3. Hammond, J.C. McGarvey and Yusibov, V. (2009). Plant Biotechnology, Springer Verlag. New York.
4. Islam, A.S. (1996). Plant tissue culture. Oxford & IBH Publishing Company Pvt. Ltd. New Delhi.
5. Purohit, S.S. (2010). Plant tissue culture, Student edition, Jodhpur.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain basic knowledge on plant tissue culture.	K1
CO2	Understand the techniques involved in the plant tissue culture for betterment of crops.	K2
CO3	Produce artificial seeds.	K3
CO4	Apply the knowledge of plant tissue culture on conservation of endangered plants.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong H - High M - Medium L – Low

Program: B.Sc. Botany				
Core Practical-II	**Course Code:** 21UBO4P02		**Course Title:** Core Course - III & IV (Plant Anatomy, embryology of angiosperms, microtechniques, Cell and Molecular biology)	
Semester IV	**Hours/Week** 6	**Total Hours** 45	**Credits** 3	**Total Marks** 100

Course Objectives

1. To learn about the special structures associated with the plant anatomy.
2. To know the role of fixatives and slide preparation techniques.
3. To explore the cellular organelles in the plant cell.

Anatomy of Angiosperms

1. Study of simple and complex tissues by using permanent slides.
2. Study of primary structure and sectioning of Dicot stem, root, leaf, Monocot stem, root and leaf.
3. Anomalous secondary structures – *Nyctanthes* and *Dracaena*.
4. Stomatal types: Anomocytic, Anisocytic, Paracytic, Diacytic and Graminaceous. (Peel out from leaf).

Embryology of Angiosperms

1. Structure of Anther (Young and Mature from *Datura* or *Cassia* flower)
2. Types of ovules: Anatropous, Orthotropous, Circinotropous, Amphitropous, Campylotropous (Permanent slides)
3. Stages in Microsporogesis and Megasporogensis (Permanent slides onion flower Bud).
4. Observes the globular, terpedo and Heart shape embryo.
5. Structure of Endosperm. Nuclear (Coconut water), cellular endosperm (Cucumber seed) and Ruminate (fruit of *Arecha catechu*).

Micro-techniques

1. Staining- simple and double staining (Safranin-Fast Green).
2. Mounting (DPX).

Cell and Molecular Biology

1. Observation and study of ultrastructure of cell organelles (chart, slides, models & micrographs).
2. Observation of different stages of mitosis in onion root tip squash preparation.
3. Observation of the Scheme/ Photograph of Structure of DNA, tRNA, and mRNA, Transcription, Translation, 'Lac' operon, 'Trp' operon.

*** Bonafide record of practical work done should be submitted for the practical examination.**

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Imply the embryological and anatomical knowledge to differentiate the plant taxa.	K3
CO2	Familiarize the basic skills on fixation, dehydration, infiltration and staining process of the specimens.	K4
CO3	Distinguish the structure of plant cell organelles and their functions.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	M	H	H
CO2	H	M	H	S	M
CO3	S	H	M	H	H

S - Strong H - High M - Medium L – Low

SRI VIDYA MANDIR ARTS AND SCIENCE COLLEGE (Autonomous)

KATTERI – 636 902

UG MODEL PRACTICAL QUESTION PAPER

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2021-22 onwards)

Core Practical: II (Plant anatomy, embryology of angiosperms, microtechniques, Cell and molecular biology)

Time: 3 Hours **Max. Marks: 60 Marks**
Practical: 55 Marks
Record : 05 Marks

BREAK UP OF MARKS

1. Take transverse sections of A, B & C Stain and mount in glycerin. Identify giving Reasons. Draw diagrams. Leave the slides for valuation (8x3 = 24 Marks)

2. Dissect and mount any one of the stages of the given material D. (Notes not necessary) (10 marks)

3. Make acetocarmine preparation of E (Squash) any one stage. Draw diagram (09 Marks)

4. Write notes on F, G, H, I, J, and K (6 x 2 = 12 Marks)

KEY

A , B, & C - Angiosperm – Anatomy – Vegetative part.
(Preparation 2, Identification 2, Diagram 2, Reason 2) (8X3=24 marks)

D - Embryo – Dicot – Tridax - (preparation 3, diagram 2) 10 Marks
E - Onion root tip - (Preparation -7 marks, Diagram -2 marks) 9 Marks

F, G, H, I, J & K Permanent slides
(Anatomy, Embryology, Microtechnique, Cell and Molecular Biology)
(Identification -1 marks, Reason -1) 12 Marks

ALLIED COURSE

Program: B.Sc. Botany				
Allied – I B.Sc. Zoology/Chemistry	**Course Code:** 21UBO1A01	**Course Title:** Phycology, Mycology and Plant pathology, Bryophytes, Pteridophytes and Gymnosperms		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	6	90	4	100

Course Objectives

1. To enhance the fundamental knowledge of the plant kingdom.
2. To learn the structure and life cycle patterns of primitive to advanced life forms.
3. To know the economic importance of primitive plants.

UNIT – I

Phycology: General characters, classification of algae (Fristch, 1954), Structure, Reproduction and life history of the following Genus: *Oscillatoria*, *Oedogonium*, *Sargassum* and *Gracilaria*. Economic importance of algae.

UNIT – II

Mycology and Plant Pathology: General characters, Structure, Reproduction and Life cycle of the following Genus: *Penicillium*, *Albugo* and *Agaricus.* Economic importance of Fungi.

UNIT – III

Bryophytes: General characters, Structure, Reproduction and Life cycle of *Marchantia* and *Funaria*. Economic importance of Bryophytes.

UNIT – IV

Pteridophytes: General characters, Structure, Reproduction and Life cycle of *Lycopodium* and *Adiantum*. Economic importance of Pteridophytes.

UNIT – V

Gymnosperms: General characters, Structure, Reproduction and Life cycle of *Cycas* and *Gnetum.* Economic importance of Gymnosperms.

Text Books

1. Gangulee, Das and Kar. (2001). College Botany Vol II. New central Book agency Pvt. Ltd. Calcutta.
2. Pandey, B.P. (1994). A Text book of Botany - Pteridophyta. Chand & Co. New Delhi.

Reference Books

1. Vashishta, B.R. (1998). The Algae.S. Chand & Co., New Delhi.
2. Vashishta, B.R. (1998). Fungi. S. Chand & Co., New Delhi.
3. Vashista, P.C., Sinha and Anil Kumar. (2008). Text book of Bryophytes. Chand & Co., New Delhi.
4. Vashista, P.C. (1992). Pteriodophyta. Chand & Co., New Delhi.
5. Pandey, B.P. (1981). Gymnosperms. Chand & Co., New Delhi.
6. Gilbert M. Smith (1951). Manual of Phycology. New Delhi.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate and identify the plant types.	K3
CO2	Understand the life cycle patterns of cryptogamous and gymnosperms.	K4
CO3	Apply the knowledge of bacteria and virus.	K4
CO4	Explore the economic importance of lower life forms.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong **H** - High **M** - Medium **L** – Low

Program: B.Sc. Botany				
Allied – II B.Sc. Zoology/Chemistry	**Course Code:** 21UBO2A02	**Course Title:** Cytology, Anatomy, Embryology, Taxonomy of Angiosperms, Plant physiology and Ecology		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	6	90	4	100

Course Objectives

1. To learn the plant cell organelles and its functions.
2. To differentiate the anatomical and embryological features.
3. To acquire knowledge on the classification and nomenclature of angiosperms.
4. To know the physiological and ecological adaptation of plants.

UNIT – I

Cytology: Study of plant cell organelles with emphasis on cell wall, Chloroplast, Mitochondria and Nucleus.

UNIT – II

Anatomy & Embryology: Primary and secondary structure of dicot and monocot leaf, stem and root (Mesophytic only). Embryology - structure of anther, microsporogenesis and male gametophyte. Structure of ovule, megasporogenesis and female gametophyte. Double fertilization.

UNIT – III

Taxonomy of Angiosperms: Bentham and Hooker's classification (outline only). Study of the following families with their economic importance - *Leguminaceae, Cucurbitaceae, Rubiaceae, Asteraceae, Euphorbiaceae* and *Arecaceae*. Herbarium techniques.

UNIT – IV

Plant Physiology: Water relationships of plants. Osmosis and absorption of water. Photosynthesis: Photosynthetic apparatus, primary photochemical reaction, path of carbon (Calvin cycle). Respiration: Glycolysis and Krebs cycle. Phytohormones: auxins and cytokinins.

UNIT – V

Ecology: Structure and functions of ecosystems. Vegetational types of Southern India. Pollution- Air, water and noise. Morphological and anatomical adaptations in Hydrophytes and Xerophytes.

Text Books

1. Gangulee, H.C., Das, K.S. and Dutta, C.T. (1986). College Botany Vol. - I.AIU Publications. New Delhi.
2. Pandey, S.N., Misra, S.P and Trivedi, P.S. (2016). A Textbook of Botany. Volume - I, 13th Edition. Vikas Publishing House.
3. Gangulee and Kar, A.K. (1986). College Botany Vol. - II. AIU Publications. New Delhi.
4. Pandey, S.N., Misra, S.P and Trivedi, P.S. (2016). A Textbook of Botany. Volume - II, 13th Edition. Vikas Publishing House.

Reference Books

1. Pandey, B.P. (1997). Taxonomy of Angiosperms. Chand & Co., New Delhi.
2. Jain, V.K. (1993). Fundamentals of plant physiology. S. Chand & Co. New Delhi
3. Shukla, R.S. and Chandal, P.S. (2000). Plant Ecology and soil science. Chand & Co. Ltd., New Delhi.
4. Bhojwani and Bhatnager. (1977). The embryology of angiosperms. Vikas Publishing House, New Delhi.
5. Pandey, B.P. (1978). Plant Anatomy. Chand and Co, New Delhi.
6. Maheswari, P. (1950). An introduction to the embryology of Angiosperms. McGraw Hill.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Gain knowledge on plant cell organelles.	K1
CO2	Understand the anatomical and embryological variations of plant taxa.	K2
CO3	Apply the knowledge using keys and manuals for identifying unknown plants at species level.	K3
CO4	Demonstrate various physiological experiments.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong **H** - High **M** - Medium **L** – Low

SRI VIDYA MANDIR ARTS AND SCIENCE COLLEGE (Autonomous)

KATTERI - 636 902

UG MODEL PRACTICAL QUESTION PAPER

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2021-2022 onwards)

Time: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Allied Practical: FIRST / SECOND ALLIED COURSE – II

Maximum: 60 Marks Practical : 50 Marks

Record: 10 Marks

1. Take transverse section of A & B. Stain and mount in Glycerin. Identify giving reasons. Draw diagrams. Submit the slides for valuation. (10 Marks)
2. Refer C & D to their families, giving reasons (Diagrams not necessary) (10 Marks)
3. Identify the plant, family and morphology of the parts used for E, F, G, H and I. (15 Marks)
4. Write critical notes on J, K, L, M, N and O. Draw diagrams. (12 Marks)
5. Physiology Experimental setup - P (3 Marks)

KEY

1. For A and B – (Slide -2 Identification -1 Reasons – 2) 2 x 5 = 10 Marks
2. For C and D - Any two plants prescribed in the syllabus. (Reasons 3, Identification -2) 2 x 5 = 10 Marks
3. For E, F, G, H and I - any 5 specimens given in the practical syllabus. 5 x 3 = 15 Marks
4. Notes 1, Diagram 1 for J, K, L, M, N, O 2 x 6 = 12 Marks
5. P - Physiology Experimental setup 3 Marks

*** Bonafide record of practical work done should be submitted for the practical examination.**

NMEC

Program: B.Sc. Botany				
NMEC – I	**Course Code:** 20UBO3N01	**Course Title** Mushroom Cultivation Technology		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	2	30	2	100

Course Objectives

1. To acquire knowledge of on the mushroom culture.
2. To understand the importance of mushrooms.
3. To learn the methodology involved in mushroom cultivation.
4. To know the various recipes preparation.

UNIT – I

Introduction to mushroom cultivation: General characters, structure and reproduction of mushrooms – Identification of mushrooms – Types of mushroom – Poisonous mushroom.

UNIT – II

Uses of mushroom: Nutritive, food and Medicinal value.

UNIT– III

Mushroom culture techniques: Mushroom sheds construction – Spawn preparation – Medium preparation – Spawn running – Incubation – Cultivation methods for button & oyster mushrooms – Disease and control measures.

UNIT– IV

Post harvest operations: Harvesting – Storage and preservation – Spoilage of mushrooms – Packing – Marketing.

UNIT – V

Mushroom recipes: Mushroom soup – Sandwich – Gravy – Omelette – Mushroom chilly manchurian and briyani.

Text Books

1. Suman, B.C and Sharma, V.P. (2007) Mushroom Cultivation in India. Daya Publishing House. New Delhi.

2. Gogoi, R., Rathaiah, Y and Borah, T.R. (2006). Mushroom Cultivation Technology. Scientific Publishers. Jodhpur, Rajasthan.
3. Kanniyan, (1980). Text book of Mushroom, Today and Tomorrow publishers, Chennai.
4. Nita bahl, (1988). Hand book of mushrooms, Vol. II, IBH publishers, New Delhi.
5. Subrata Biswas, Datta, M., Ngachan, S.V. (2011) Mushrooms: A Manual For Cultivation. PHI Learning, New Delhi.

Reference Books

1. Chang S.T. and N.A.Hayer, 2002. The biology and cultivation of edible mushrooms.
2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Manjit Singh, Bhuvnesh Vijay, Shwet Kamal and Wakchaure, C.G. (2011). Mushrooms - cultivation, marketing and consumption. Directorate of Mushroom research, ICAR, Chambaghat, Solan, HP.
4. Pathak, V.N., Yadav, N. and Gour, M., 2000. Mushroom production and processing technology, Agrobios Ltd., Jodhpur, India.
5. Reeti Singh and U.C. Singh, (2005). Modern Mushroom cultivation, Agrobios (India) Ltd.
6. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., Bangalore.
7. Tewari and Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge on mushrooms to differentiate edible from poisonous.	K1
CO2	Understand the mushroom cultivation.	K2
CO3	Apply knowledge on cultivation of the mushroom using techniques.	K3
CO4	Impart interest on preparation of mushroom recipes.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong **H** - High **M** - Medium **L** – Low