



Anekant Education Society's

**Tuljaram Chaturchand College of Arts, Science & Commerce,
Baramati**

(Autonomous)

Three/Four Year Honours/Honours with Research B. Sc. Degree

Program in Botany

(Faculty of Science)

CBCS Syllabus

F. Y. B. Sc. (Botany) Semester - I and II

For Department of Botany

NEP 2.0

Choice Based Credit System Syllabus (2024 Pattern)

(As Per NEP 2020)

To be implemented from Academic Year 2024-2025

Title of the Programme: F.Y. B. Sc. (Botany)

Preamble

AES's Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous) has decided to change the syllabus of various faculties from June, 2023 by taking into consideration the guidelines and provisions given in National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. The credit structure and courses framework provided in the NEP are nationally accepted and internationally comparable.

The rapid changes in science and technology and new approaches in different areas of Botany and related subjects, the Board of Studies in Botany at Tuljaram Chaturchand College, Baramati - Pune, has prepared the syllabus of F.Y. B.Sc. Botany Sem. I and II the Choice Based Credit System (CBCS) by following the guidelines of NEP 2020, NCER, NHEQF, Prof. R.D. Kulkarni's Report, GR of Government of Maharashtra dated 20th April, 16th May 2023 and 13th March 2024 and the Circular of SPPU, Pune dated 31st May 2023 and 2nd May, 2024.

A Botany degree equips students with the knowledge and skills necessary for a diverse range of fulfilling career paths. Graduates in Botany find opportunities in various fields, including urban planning, teaching, environmental science, all plant sciences, organic farming, nursery management, entrepreneurship, mushroom cultivation, medicinal plant, floriculture, horticulture, propagation methods and plant tissue culture method and many other domains. Throughout their three year degree program, students explore the significance of plant in life of each and every living organism on Earth. They learn tool, techniques, process which is required to set up agencies including pickles, jam, and jelly, medicinal plant, fruit processing, vegetable processing, organic product, organic fertilizer and pesticides producing industries also they can earn the knowledge to produce natural remedies for various diseases. They become expert in discovery and development of many new therapeutic compounds which are now used in pharmaceutical herbal cosmetics and other compound based industries.

Overall, revising the Botany syllabi in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Specific Outcomes (PSOs)

PSO1. Knowledge and understanding of: 1. The range of plant diversity in terms of structure, anatomy, function and environmental relationships. 2. The evaluation of plant diversity. 3. Identification and classification and the flora of Maharashtra. 4. The role of plants in the functioning of the global ecosystem. 5. A selection of more specialized, optional topics. 6. Application of Statistics to solve biological problem.

PSO2. Intellectual skills – able to: 1. Think logically and organize tasks into a structured form. 2. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one concept to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing research field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.

PSO3. Practical skills: Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation study techniques. 4. Analysis of chemical compounds in plant materials in the context of plant physiology and biochemistry. 5. Analyze data using appropriate statistical methods and computational packages. 6. Plant pathology to be added for lab to land farm.

PSO4. Transferable skills: 1. Use of IT (word-processing, use of internet, statistical packages and databases). 2. Communication of scientific ideas in writing and orally. 3. Ability to co-ordinate as part of team. 4. Ability to use library resources. 5. Time

PSO5. Scientific Knowledge: Apply the knowledge of basic plant science, life sciences and fundamental process of plants to study and analyze any plant form.

PSO6. Problem analysis: Identify the taxonomic position of plants, formulate the research literature and analyze PET structure and non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

PSO7. Design/development of solutions: Design solutions from medicinal plants to solve health problems, disorders and disease of human beings and animals

estimate the phytochemical content of plants which fulfil the specified needs to appropriate consideration for the public and animal health.

PSO8. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide scientific conclusions.

PSO9. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology, Bioinformatics, Biophysics, Biostatistics, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and

PSO10. The Botanist and society: Apply reasoning informed by the contextual knowledge to assess plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

PSO11. Environment and sustainability: Understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable agricultural and environmental development.

PSO12. Ethics: Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.

PSO13. Individual and team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary task settings.

PSO14. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and interpret effective reports and design documentation, make effective presentations and give and receive clear instructions.

PSO15. Project management and finance: Apply knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team to manage projects and in eco-friendly environments.

PSO16. Life-long learning: Identify the necessities and have the preparation and ability to engage in independent and life-long learning in the broadest context of upcoming advanced technology.

Anekant Education Society's
Tuljaram Chaturchand College, Baramati
(Autonomous)

Board of Studies (BOS) in Botany

From 2022-23 to 2024-25

Sr. No.	Name	Designation
1.	Prof. Dr. Bhagwan Mali	Chairman
2.	Prof. Dr. Mahadev Kanade	Member
3.	Prof. Dr. Ajit Telave	Member
4.	Dr. Rupali Chitale	Member
5.	Dr. Madhuri Patil	Member
6.	Mr. Sauraj N. Torane	Member
7.	Ms. Ashwini B. Dudhal	Member
8.	Mr. Prasad J. Bankar	Member
9.	Mr. Sourabh R. Chandankar	Member
10.	Prof. Dr. B. M. Gaykar	Expert from SPPU, Pune
11.	Prof. D. K. Gaikwad	Expert from other university
12.	Dr. Jay Chavan	Expert from other university
13.	Dr. S. Gurumurthy	Expert from allied area
14.	Mr. Gore Nitin Anil	Meritorious Student
15.	Ms. Ligade Komal Sambhaji	Meritorious Student
16.	Mr. Zodage Ram Sanjay	Meritorious Student
17.	Ms. Gargade Rutuja Hanumant	Meritorious Student

Credit Distribution Structure for Three/Four Year Honours/Honours with Research Degree Programme

Level/ Difficulty	Sem	Subject DSC-1				Subject DSC-2	Subject DSC-3	GE/OE	SEC	IKS	AEC	VEC	CC	Total
4.5/100	I	2(T)+2(P)				2(T)+2(P)	2(T)+2(P)	2(T)	2 (T/P)	2(T) (Generic)	2(T)	2(T)	--	22
	II	2(T)+2(P)				2(T)+2(P)	2(T)+2(P)	2(P)	2 (T/P)	--	2(T)	2(T)	2(T)	22
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/Internship OR Continue with Major and Minor Continue option: Student will select one subject among the (subject 1, subject 2 and subject 3) as major and other as minor and third subject will be dropped.														
Level/ Difficulty	Sem	Credits Related to Major				Minor	--	GE/OE	SEC	IKS	AEC	VEC	CC	Total
		Major Core	Major Elective	VSC	FP/OJT/CEP/RP									
5.0/200	III	4(T)+2(P)	--	2 (T/P)	2(FP)	2(T)+2(P)	--	2(T)	--	2(T)	2(T)	--	2(T)	22
	IV	4(T)+2(P)	--	2 (T/P)	2(CEP)	2(T)+2(P)	--	2(P)	2 (T/P)	--	2(T)	--	2(T)	22
Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4credits core NSQF course/Internship OR Continue with Major and Minor														
5.5/300	V	8(T)+4(P)	2(T)+2(P)	2 (T/P)	2(FP/CEP)	2(T)	--	--	--	--	--	--	--	22
	VI	8(T)+4(P)	2(T)+2(P)	2 (T/P)	4 (OJT)	--	--	--	--	--	--	--	--	22
Total 3Years		44	8	8	10	18	8	8	6	4	8	4	6	132
Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor														
6.0/400	VII	6(T)+4(P)	2(T)+2 (T/P)	--	4(RP)	4(RM)(T)	--	--	--	--	--	--	--	22
	VIII	6(T)+4(P)	2(T)+2 (T/P)	--	6(RP)	--	--	--	--	--	--	--	--	22
Total 4Years		64	16	8	22	22	8	8	6	4	8	4	6	176
Four Year UG Honours with Research Degree in Major and Minor with 176 credits														
6.0/400	VII	10(T)+4(P)	2(T)+2 (T/P)	--	--	4(RM) (T)	--	--	--	--	--	--	--	22
	VIII	10(T)+4(P)	2(T)+2 (T/P)	--	4 (OJT)	--	--	--	--	--	--	--	--	22
Total 4Years		72	16	8	14	22	8	8	6	4	8	4	6	176
Four Year UG Honours Degree in Major and Minor with 176 credits														
T = Theory P = Practical DSC = Discipline Specific Course OE = Open Elective SEC = Skill Enhancement Course IKS = Indian Knowledge System AEC = Ability Enhancement Course VEC = Value Education Course CC = Co-curricular Course VSC= Vocational Skill Course OJT= On Job Training CEP= Community Engagement Project FP= Field Project RP= Research Project														

With Multiple Entry and Exit options as per National Education Policy (2024 Pattern as per NEP 2020)

F. Y. B .Sc. Botany
NEP – 2.0
Course Structure for F. Y. B. Sc. (2024 Pattern)

CBCS Syllabus as per NEP 2020 for F.Y. B. Sc. Botany (2024 Pattern)

Sem.	Course Type	Course Code	Course Title	Theory / Practical	Credits
I	DSC-I (General)	-101-GEN		T	02
		-102-GEN		P	02
	DSC-II (General)	-101-GEN		T	02
		-102-GEN		P	02
	DSC-III (General)	BOT-101-GEN	Plant Diversity	T	02
		BOT-102-GEN	Botany Practical - I	P	02
	Open Elective (OE)	BOT-103-OE	Horticulture	T	02
	Skill Enhancement Course (SEC)	BOT-104-SEC	Fruit Processing Industries	P	02
	Ability Enhancement Course (AEC)	ENG-104-AEC		T	02
	Value Education Course (VEC)	ENV-105-VEC		T	02
Generic Indian Knowledge System (GIKS)	GEN-106-IKS		T	02	
Total Credits Semester-I					22
II	DSC-I (General)	-151-GEN		T	02
		-152-GEN		P	02
	DSC-II (General)	-151-GEN		T	02
		-152-GEN		P	02
	DSC-III (General)	BOT-151-GEN	Industrial Botany	T	02
		BOT-152-GEN	Botany Practical - II	P	02
	Open Elective (OE)	BOT-153-OE	Floriculture	P	02
	Skill Enhancement Course (SEC)	BOT-154-SEC	Mushroom Cultivation	P	02
	Ability Enhancement Course (AEC)	ENG-154-AEC		T	02
	Value Education Course (VEC)	COS-155-VEC		T	02
Co-curricular Course (CC)	YOG/PES/CUL/NS S/NCC-156-CC	To be selected from the CC Basket	T	02	
Total Credits Semester-II					22
Cumulative Credits Semester I + Semester II					44

CBCS Syllabus as per NEP 2020 for F.Y. B. Sc. Botany (2024 Pattern)

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: I
Course Type	: DSC - III (General) (Theory)
Course Code	: BOT-101-GEN
Course Title	: Plant Diversity
No. of Credits	: 02
No. of Teaching Hours	: 30

Course Objectives:

1. To know the basics of plant diversity.
2. To understand the plant diversity with special reference to cryptogams and phanerogams.
3. To give knowledge of identification of cryptogams and phanerogams.
4. To learn the classification of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
5. To understand the life cycle pattern of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
6. To give knowledge of economical and industrial importance of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
7. Give an idea about need of habitat conservation of plant diversity.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Know the basics of plant diversity.
- CO2. Know the plant diversity with special reference to cryptogams and phanerogams.
- CO3. Gain the proficiency in the identification of cryptogams and phanerogams.
- CO4. Know the classification of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
- CO5. To understand the life cycle pattern of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
- CO6. To know economical and industrial importance of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
- CO7. Get an idea about need of habitat conservation of plant diversity.

Topics and Learning Points:

UNIT: 1	(14L)
1.1 Introduction : General outline of plant kingdom, introduction to cryptogams and phanerogams and their scope and importance, awareness and need of conservation.	(4L)
1.2 Algae : Introduction, Classification, Life cycle of <i>Spirogyra</i> , Economic/Industrial importance of algae.	(4L)

1.3 **Fungi** : General characters, Classification, Life cycle of *Rhizopus*, Economic/Industrial importance of fungi. (4L)

1.4 **Lichens**: General characters, Types of Lichens on the basis of thallus morphology, Economic/Industrial importance of Lichens. (2L)

UNIT: 2 (08L)

2.1 **Bryophytes**: General characters, Life cycle of *Riccia*, Economic/Industrial importance of Bryophytes. (4L)

2.2 **Pteridophytes** : General characters, Life cycle of *Equisetum*, Economic/Industrial importance of Pteridophytes. (4L)

UNIT: 3 (08L)

3.1 **Gymnosperms**: General Characters, Life cycle of *Cycas*, Economic/Industrial importance of Gymnosperms. (4L)

3.2 **Angiosperms**: General Characters, Comparative account of monocotyledons and dicotyledons, Economic/Industrial importance of Gymnosperms. (4L)

References:

1. Bellinger E.G. and Sigeo D.C. (2010): Freshwater algae: Identification and use as bio indicators, Willey-Blackwell, UK.
2. Krishnamurthy V. (2000) : Algae of India and neighboring countries I. Chlorophycota, Oxford and IBH, New Delhi.
3. Lee R.E. (2008) : Phycology. Cambridge University Press.
4. Vashista B.R, Sinha A.K. and Singh V.P. (2005): Botany for degree students –Algae, S. Chand Publication.
5. Ainsworth, Sussman and Sparrow (1973) : The fungi. Vol IV A & IV B. Academic Press.
6. Alexopolous C.J., Minms C.W. and Blackwell M. (1999): (4th Ed.) Introductory Mycology. Willey, New York, Alford R.A.
7. Deacon J. W. (2006): Fungal Biology (4th Ed.) Blackwell Publishing.
8. Mehrotra R.S. and Aneja K. R. (1990): An introduction to mycology. New Age Publishers.
9. Miguel U., Richard H., and Samuel A. (2000) : Illustrated dictionary of the Mycology. Elvira Aguirre Acosta, Publisher: St. Paul, Minn: APS press, ISBN 0890542570.
10. Webster J. and Rpland W. (2007) : Introduction to fungi (3rd Edn) Cambridge University Press.
11. Dube H.C. (2004) : An Introduction to fungi. Vikas Publishers.
12. Sharma O.P. (2010) : A text book of fungi. S.Chand Publication.
13. Vashista B.R and Sinha A.K (2008): Botany for degree students – Fungi, S.Chand Publication.
14. Vashista B.R., Sinha A.K., Kumar A. (2008) : Botany for degree students – Bryophyta, S.Chand Publication.
15. Rashid A. (1999): An Introduction to Pteridophyta. Vikas Publishing House Pvt. Ltd. New Delhi.
16. Smith G. M. (1955): Cryptogamic Botany Vol II. McGraw Hill.
17. Sporne K. R. (1986): The morphology of Pteridophytes. Hutchinson University Library, London.
18. Gangulee and Kar (2006) : College Botany, New Central Book Agency (P) Ltd. Kolkata
19. Naik V. N. (1994) : Taxonomy of Angiosperms, Tata Mc Graw Hill Publishing Comp., New Delhi
20. Pandey B. P. (2009) : A Text Book of Botany- Angiosperms, S. Chand and Comp. Ltd. New Delhi
21. Lawrence GHM (2012) : Taxonomy of vascular plant, Scientific Publishers, (India) Jodhpur.
22. Eames A.J. (1961) : Morphology of the angiosperms, Mc. Graw Hill, New York.
23. Ashok Bendre & Ashok Kumar (1993) : A Text Book of Practical Botany II, Rastogi Publ., Meerut.
24. Dutta A. C. (2003) : Botany for Degree Students,. Oxford University Press, New Delhi.
25. Singh, V., P. C. Pande & D. K. Jain. (2011): A text book of Botany: Angiosperms, Rastogi publications.

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3												
CO 2	3												
CO 3		3		3									
CO 4	3												
CO 5	2												
CO 6	2		3										
CO 7	2										3		3

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO1. Know the basics of plant diversity.

CO2. Know the plant diversity with special reference to cryptogams and phanerogams.

CO4. Know the classification of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.

CO5. To understand the life cycle pattern of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.

CO6. To know economical and industrial importance of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.

CO7. Get an idea about need of habitat conservation of plant diversity.

PO2. Practical, Professional, and Procedural Knowledge

CO3. Gain the proficiency in the identification of cryptogams and phanerogams.

PO3. Entrepreneurial Mindset and Knowledge

CO6. To know economical and industrial importance of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.

PO4. Specialized Skills and Competencies

CO3. Gain the proficiency in the identification of cryptogams and phanerogams.

PO11. Value Inculcation and Environmental Awareness

CO7. Get an idea about need of habitat conservation of plant diversity.

PO13. Community Engagement and Service

CO7. Get an idea about need of habitat conservation of plant diversity.

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: I
Course Type	: DSC - III (General) (Practical)
Course Code	: BOT-102-GEN
Course Name	: Botany Practical - I
No. of Credits	: 02
No. of Teaching Hours	: 60

Course Objectives:

- 1.To give knowledge about handling of microscope.
- 2.To give the practical knowledge about morphological and anatomical variations in cryptogams and phanerogams.
- 3.To give practical knowledge about identification of cryptogams and phanerogams.
- 4.To give skill of sectioning of plant material.
- 5.To give skill of slide preparation and staining of plant material.
- 6.To impart the career opportunities in plant based industries
- 7.To impart the basic skills in the conservation of plant diversity.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Expertise in handling of microscope.
 CO2. Knowledge of morphological and anatomical variations in cryptogams and phanerogams.
 CO3. Identify the cryptogams and phanerogams.
 CO4. Expertise in sectioning of plant material.
 CO5. Expertise in slide preparation and staining of plant material.
 CO6. Get knowledge of career opportunities in plant based industries.
 CO7. Know the basic skills in the conservation of plant diversity.

Practicals

- | | |
|---|------|
| 1. Study of <i>Spirogyra</i> . | (1P) |
| 2. Cultivation of BGA as biofertilizer. | (1P) |
| 3. Cultivation of Single Cell Protein (<i>Spirulina</i>). | (1P) |
| 4. Study of <i>Rhizopus</i> . | (1P) |
| 5. Cultivation of <i>Pleurotus</i> . | (1P) |
| 6. Study of Lichen diversity. | (1P) |
| 7. Study of economical uses of lichens. | (1P) |
| 8. Study of <i>Riccia</i> . | (1P) |
| 9. Study of economical uses of bryophytes. | (1P) |
| 10. Study of <i>Equisetum</i> . | (1P) |
| 11. Study of economical uses of pteridophytes. | (1P) |
| 12. Study of <i>Cycas</i> . | (1P) |
| 13. Study of economical uses of gymnosperms. | (1P) |
| 14. Study of economical uses of angiosperms. | (1P) |
| 15. Submission of five specimens of Cryptogams and phanerogams. | (1P) |

(Note: Visit for submission mentioned in the practical no. 15 is compulsory).

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1		3		3			3		3				
CO 2	3												
CO 3	3			2	3								
CO 4	2						2	3					
CO 5	3						3	3					
CO 6	3		3			3							
CO 7	2										3		3

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO2. Knowledge of morphological and anatomical variations in cryptogams and phanerogams.

CO3. Identify the cryptogams and phanerogams.

CO4. Expertise in sectioning of plant material.

CO5. Expertise in slide preparation and staining of plant material.

CO6. Get knowledge of career opportunities in plant based industries.

CO7. Know the basic skills in the conservation of plant diversity.

PO2. Practical, Professional, and Procedural Knowledge

CO1. Expertise in handling of microscope.

PO3. Entrepreneurial Mindset and Knowledge

CO6. Get knowledge of career opportunities in plant based industries.

PO4. Specialized Skills and Competencies

CO1. Expertise in handling of microscope.

CO3. Identify the cryptogams and phanerogams.

PO5. Capacity for Application, Problem-Solving, and Analytical Reasoning

CO3. Identify the cryptogams and phanerogams.

PO6. Communication Skills and Collaboration

CO6. Get knowledge of career opportunities in plant based industries.

PO7. Research-related Skills

CO1. Expertise in handling of microscope.

CO4. Expertise in sectioning of plant material.

CO5. Expertise in slide preparation and staining of plant material.

PO8. Learning How to Learn Skills

CO4. Expertise in sectioning of plant material.

CO5. Expertise in slide preparation and staining of plant material.

PO9. Digital and Technological Skills

CO1. Expertise in handling of microscope.

PO11. Value Inculcation and Environmental Awareness

CO7. Know the basic skills in the conservation of plant diversity.

PO13. Community Engagement and Service

CO7. Know the basic skills in the conservation of plant diversity.

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: I
Course Type	: OE – Open Elective (Theory)
Course Code	: BOT-103-OE
Course Title	: Horticulture
No. of Credits	: 02
No. of Teaching Hours	: 30

Course Objectives:

1. To understand scope of horticulture with special reference to production, export and import of fruits and vegetables.
2. To give knowledge of preparation of nursery beds.
3. To give knowledge of use of fertilizers and pesticides.
4. To give idea about basics and types of fruit gardening.
5. To know the basics of pomiculture.
6. To aware use of growth regulators in horticulture.
7. To impart the basic skills in the field of horticulture.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Understand plants used in horticulture.
 CO2. Knowledge about the plan and preparation of nursery beds.
 CO3. Use fertilizers and pesticides in orchards.
 CO4. Design orchards.
 CO5. Knowledge of pomiculture.
 CO6. Use growth regulators in horticulture.
 CO7. Develop entrepreneurship in horticulture.

Topics and Learning Points:**UNIT: 1** **(10 L)**

- 1.1 Scope and importance, classification of horticultural crops and nutritive values, area and production, exports and imports, fruit and vegetable zones of India. **(06L)**
- 1.2 Nursery techniques and their management, garden implements, soil and climate, vegetable gardens, nutrition and kitchen garden and Hydroponics. **(04L)**

UNIT: 2 **(10L)**

- 2.1 Production and practices for fruit crops. Principles, objectives, types and methods of pruning and training of fruit crops. **(04L)**
- 2.2 Types and use of growth regulators in horticulture, water management-irrigation methods, merits and demerits, weed management, fertigation management in horticultural crops (manures and fertilizers). **(06L)**

UNIT:3

(10L)

3.1 Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness (root-microbe association). Rejuvenation of old orchards, top working and frame working. **(06L)**

3.2 Principle and concept of organic farming, market chain management, model of organic farming (1lac) **(04L)**

References:

- 1.Arora J. S. (2014): Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi.
- 2.Augé R andVidalie H. (1995): In Vitro Culture and Its Applications in Horticulture. Science Publishers Incorporated, USA.
- 3.Sheela V. L. (2011): Horticulture. MJP Publishers, New Delhi.
- 4.Bhojwani S. S., Razdan M. K. (1996): Plant tissue culture: Theory and Practice. Revised edition, Elsevier, Amsterdam.
- 5.Duryea M. L. (1984): Nursery cultural practices: Impacts on seedling quality. In forest nursery manual: Production of Bareroot seedlings.
- 6.Duryea M. L. and Thomas, D. L. (Ed.) (1975): Fundamentals of Horticulture. McGraw-Hill, USA.
- 7.Prasad S. (1999):Agros Dictionary of Horticulture. Agrobios, Jodhpur.
- 8.Rao K. M. (2005): Textbook of Horticulture. McMillan India Ltd, New Delhi.
- 9.Sanders T. W. (2006): Encyclopedic Dictionary of Horticulture. Bio Green Books, Delhi.

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3												
CO 2	3	3											
CO 3		3									3		
CO 4	2	3											3
CO 5	2			3									
CO 6	2			3									
CO 7			3										

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO1. Understand plants used in horticulture.

CO2. Knowledge about the plan and preparation of nursery beds.

CO4. Design orchards.

CO5. Knowledge of pomiculture and hydroponics.

CO6. Use growth regulators in horticulture.

PO2. Practical, Professional, and Procedural Knowledge

CO2. Knowledge about the plan and preparation of nursery beds.

CO3. Use fertilizers and pesticides in orchards.

CO4. Design orchards.

PO3. Entrepreneurial Mindset and Knowledge

CO7. Develop entrepreneurship in horticulture.

PO4. Specialized Skills and Competencies

CO5. Knowledge of pomiculture and hydroponics.

CO6. Use growth regulators in horticulture.

PO11. Value Inculcation and Environmental Awareness

CO3. Use fertilizers and pesticides in orchards.

PO13. Community Engagement and Service

CO4. Design orchards.

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: I
Course Type	: SEC (Skill Enhancement Course)
Course Code	: BOT-104-SEC
Course Title	: Fruit Processing Industries
No. of Credits	: 02
No. of Teaching Hours	: 60

Course Objectives:

1. To learn the techniques of storage of fruits.
2. To understand importance of value addition fruit products.
3. To give knowledge of preparation of natural scented oils.
4. To equip the students with practical knowledge of fruit processing.
5. To give knowledge of Jam and Jelly preparation.
6. To impart the basic skills in the field of fruit processing.
7. To give knowledge of care and precautions taken to setup fruit processing industry.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Understand techniques of storage of fruits.
 CO2. Get importance of value addition fruit products.
 CO3. Get knowledge of preparation of natural scented oils.
 CO4. Get idea about the practical knowledge of fruit processing.
 CO5. Get knowledge of preparation of Jam and Jelly.
 CO6. Develop entrepreneurship in fruit processing
 CO7. Take care and precautions to setup fruit processing industry.

Practicals

- | | |
|--|------|
| 1. Demonstration of fruit processing units. | (1P) |
| 2. Preparation of Jam. | (1P) |
| 3. Preparation of curry leaf chutany. | (1P) |
| 4. Preparation of mango panhe. | (1P) |
| 5. Preparation of Wood Apple (Kavath) Vadi. | (1P) |
| 6. Preparation of Lemon Squash. | (1P) |
| 7. Preparation of Moringa powder. | (1P) |
| 8. Preparation of turmeric pickle. | (1P) |
| 9. Preparation of Bel Muramba. | (1P) |
| 10. Preparation of Tomato Ketchup. | (1P) |
| 11. Preparation of Mango Papad and Jackfruit Papad. | (1P) |
| 12. Preparation of Potato Wafers and Banana Wafers. | (1P) |
| 13. Preparation of Gulkand. | (1P) |
| 14. Preparation of Scented oils (Jasmine, <i>Geranium</i>) | (1P) |
| 15. Preparation of essential oils (<i>Eucalyptus</i> , <i>Lavang</i>). | (1P) |

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3							3					
CO 2	3							3					
CO 3	3												
CO 4		3											
CO 5	3												
CO 6			2										
CO 7				3	3								

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO1. Understand techniques of storage of fruits.

CO2. Get importance of value addition fruit products.

CO3. Get knowledge of preparation of natural scented oils.

CO5. Get knowledge of preparation of Jam and Jelly.

PO2. Practical, Professional, and Procedural Knowledge

CO4. Get idea about the practical knowledge of fruit processing.

PO3. Entrepreneurial Mindset and Knowledge

CO6. Develop entrepreneurship in fruit processing

PO4. Specialized Skills and Competencies

CO7. Take care and precautions to setup fruit processing industry.

PO5. Capacity for Application, Problem-Solving, and Analytical Reasoning

CO7. Take care and precautions to setup fruit processing industry.

PO8. Learning How to Learn Skills

CO1. Understand techniques of storage of fruits.

CO2. Get importance of value addition fruit products.

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: II
Course Type	: DSC-III (General) (Theory)
Course Code	: BOT-151-GEN
Course Title	: Industrial Botany
No. of Credits	02
No. of Teaching Hours	30

Course Objectives:

1. To give knowledge of plant resources and the relevant industries.
2. To give knowledge of different plant propagation methods.
3. To give knowledge of Bio-fuel Industry.
4. To give knowledge of organic farming with respect to Biopesticides and Biofertilizers.
5. To impart the career opportunities in agro based industries.
6. To give knowledge of different types of nurseries and their commercial application.
7. To impart the basic skills in the field of Floriculture industry.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Get knowledge of plant resources and the relevant industries.
 CO2. Get knowledge of different plant propagation methods.
 CO3. Get knowledge of Bio-fuel Industry.
 CO4. Acquire knowledge of organic farming with respect to Biopesticides and Biofertilizers.
 CO5. Know the career opportunities in agro based industries.
 CO6. Get knowledge of different types of nurseries and their commercial application.
 CO7. Expertise in the field of Floriculture industry.

UNIT: 1 (10L)

1.1 **Introduction to Industrial Botany:** Concept of Industrial Botany. Plant resources and industries: Food, fodder, fibers, medicines, timber, dyes, gum, tannins. (Two examples of each resource and the relevant industries. (04L)

1.2 **Floriculture Industry:** Introduction, Scope, Important floricultural crops, Open cultivation practices- harvesting and marketing of Tuberose. Concept of green house, Indoor cultivation practices-harvesting and marketing of *Gerbera*. (06L).

UNIT: 2 (10L)

2.1 **Plant Nursery Industry:** Concept and types of nurseries: ornamentals, fruit plants, medicinal plants, vegetables, orchids, forest nursery, commercial applications. (04L)

2.2 **Propagation methods:** Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting: Stem, Layering: Air layering, Grafting: Stone grafting and Approach grafting, Budding: T-budding). (06L)

UNIT: 3

(10L)

3.1 **Bio-fuel Industry:** Introduction and advantages. Concept of biofuel and its need. Plants used for bio-fuel production. Commercial significance. **(4L)**

3.2 **Agro Industries:** Organic Farming: Concept and need, types of organic fertilizers, advantages and limitations. Fruit processing industries: Importance of fruit processing and Marketing, Major fruit processing industries in India. **(06L)**

References:

1. The Complete Book on Organic Farming and Production of Organic Compost (2018) : NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc.
2. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farming [Ann Larkin Hansen] (2010) : Storey Publications.
3. Kar A, (2008) : Pharmacognosy and Pharmacobiotechnology, New Age international (P) Limited, Publishers (formerly Wiley Eastern Limited).
4. Kokate C.K. (2014) : Practical Pharmacognosy, Vallabh Prakashan, New Delhi.
5. Kokate C.K. Purohit A.P. and Gokhale S.B. (2002) : Pharmacognosy, Nirali Prakashan, Pune.
6. Trease G.E. and Evans. W.C. (1983) : Pharmacognosy, ELBS Twelfth Edition
7. Tyler V.E. Brady L.R. and Robbers J.E. (1976) : Pharmacognosy Lea and Febiger. Philadelphia.8th edition KM Varghese and Co. Mumbai.
8. Vaidya S.S. and Dole V.A. (2001) : Bhaishyajakalpana, Anmol Prakashan, Pune
9. Wallis T.E. (2005) : Text books of pharmacognosy CBS publishers and distributors New Delhi (Latest Edition).
10. Pathak, Khatri, Pathak (2003) : Fundamentals of plant pathology, Agrbios.
11. Mehrotra, R.S. (1991) : Plant Pathology, Tata Mc-Graw Hill Co. Delhi.
12. Chatterjee, P. B. (1997) : Plant Protection Techniques, Bharati Bhawan, Publ. Patana
13. Agrios, G.N. (2006) : Plant Pathology, Elsevier Academic Press.
14. Pandey, B.P. (2009) : Plant Pathology, S. Chand Co.
15. Gupta, G.P. (2004) : Text book of plant diseases, Discovery Publ. House, New, Delhi
16. Singh, R.S. (2004) : Plant Diseases, Oxford & IBH Publishing Co. Pvt. Ltd., Delhi.
17. Zhiqiang A. N. (2004) : Handbook of Industrial Mycology. CRC Press
18. Gary Leatham (1993) : Frontiers in Industrial Mycology. Springer
19. A.C. Gaur (2010) : (Biofertilizers in Sustainable Agriculture. IARI, New Delhi
20. The Complete Technology Book on Biofertilizer and Organic Farming. (2013) : NIIR Board.

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3												
CO 2	3	2		3									
CO 3	3												
CO 4	2										3		3
CO 5													
CO 6	3		3										
CO 7			2										

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO1. Get knowledge of plant resources and the relevant industries.

CO2. Get knowledge of different plant propagation methods.

CO3. Get knowledge of Bio-fuel Industry.

CO4. Acquire knowledge of organic farming with respect to Biopesticides and Biofertilizers.

CO6. Get knowledge of different types of nurseries and their commercial application.

PO2. Practical, Professional, and Procedural Knowledge

CO2. Get knowledge of different plant propagation methods.

PO3. Entrepreneurial Mindset and Knowledge

CO6. Get knowledge of different types of nurseries and their commercial application.

CO7. Expertise in the field of Floriculture industry.

PO4. Specialized Skills and Competencies

CO2. Get knowledge of different plant propagation methods.

PO11. Value Inculcation and Environmental Awareness

CO4. Acquire knowledge of organic farming with respect to Biopesticides and Biofertilizers.

PO13. Community Engagement and Service

CO4. Acquire knowledge of organic farming with respect to Biopesticides and Biofertilizers.

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: II
Course Type	: DSC - III (General) (Practical)
Course Code	: BOT-152-GEN
Course Title	: Botany Practical - II
No. of Credits	02
No. of Teaching Hours	60

Course Objectives:

1. To give knowledge of plant resources and the relevant industries.
2. To give hands-on training of preparation of bio-fertilizers.
3. To give hands-on training of preparation of bio-pesticides.
4. To give hands-on training of preparation of pharmaceutical products.
5. To give hands-on training of preparation of seed beds.
6. To give hands-on training of budding, grafting, air layering and cutting.
7. To impart basic skills in floriculture industry, nursery and organic farming.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Get knowledge of plant resources and the relevant industries.
 CO2. Prepare bio-fertilizers.
 CO3. Prepare bio-pesticides.
 CO4. Prepare churna, asava and kadha.
 CO5. Prepare seed beds.
 CO6. Get expertise in budding, grafting, air layering and cutting.
 CO7. Develop basic skills in floriculture industry, nursery and organic farming.

Practicals

1. Study of plant resources – Food, Fodder, Fibre, Medicines. (1P)
2. Study of plant resources – Timber, Dye, Gum, Tannins. (1P)
3. Study of loose and cut flowers. (1P)
4. Preparation of seed beds – Raised and Sunken type. (1P)
5. Study of natural plant propagation methods. (1P)
6. Study of artificial vegetative plant propagation methods – Cutting, Air layering. (1P)
7. Study of artificial vegetative plant propagation methods – Budding, Grafting. (1P)
8. Study of plants used in preparation of biofuel. (1P)
9. Preparation of Biofertilizer - Vermicompost, Vermiwash, Panchgavya. (1P)
10. Preparation of Biofertilizer - *Azolla*, BGA, Rhizobium. (1P)
11. Preparation of Biopesticide - Dashparni Ark, Bramhastra, Agniashtra. (1P)
12. Preparation of churna, asava and kadha. (1P)
13. Preparation of layout of plant nursery. (1P)
14. Visit to plant nursery and submit report. (1P)
15. Visit to floriculture or fruit processing industry. (1P)

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3				3								
CO 2		3		3									
CO 3		2		3									
CO 4		2		3									
CO 5		3											
CO 6	3	3											
CO 7			3										

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO1. Get knowledge of plant resources and the relevant industries.

CO6. Get expertise in budding, grafting, air layering and cutting.

PO2. Practical, Professional, and Procedural Knowledge

CO2. Prepare bio-fertilizers.

CO3. Prepare bio-pesticides.

CO4. Prepare churna, asava and kadha.

CO5. Prepare seed beds.

CO6. Get expertise in budding, grafting, air layering and cutting.

PO3. Entrepreneurial Mindset and Knowledge

CO7. Develop basic skills in floriculture industry, nursery and organic farming.

PO4. Specialized Skills and Competencies

CO2. Prepare bio-fertilizers.

CO3. Prepare bio-pesticides.

CO4. Prepare churna, asava and kadha.

PO5. Capacity for Application, Problem-Solving, and Analytical Reasoning

CO1. Get knowledge of plant resources and the relevant industries.

Name of the Programme	: B. Sc. Botany
Program Code	: USBT
Class	: F. Y. B. Sc.
Semester	: II
Course Type	: OE- Open Elective
Course Code	: BOT-153-OE
Course Title	: Floriculture
No. of Credits	: 02
No. of Teaching Hours	: 60

Course Objectives:

1. To inculcate the importance of studying floriculture and usage of floricultural crops.
2. To equip the students with practical knowledge of different horticultural practices of floricultural crops.
3. To familiarize the students with the floriculture based industries at national and international level.
4. To familiarize the students with the flowers and foliage crop used in flower arrangement.
5. To give knowledge of different types of flower arrangement.
6. To give knowledge of care and precautions taken during flower arrangement.
7. To impart the basic skills in the field of floriculture.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Understand plants used in floriculture.
 CO2. Knowledge of horticultural practices of floricultural crops.
 CO3. Knowledge of floriculture based industries.
 CO4. Knowledge flowers and foliage crop used in flower arrangement.
 CO5. Create different floral designs.
 CO6. Take care and precautions during flower arrangement.
 CO7. Develop entrepreneurship in floriculture.

Practicals

1. Study of natural plant propagation methods (Rhizome, Bulb, Sucker, Runners). (01P)
2. Study of artificial plant propagation methods- Part I (Cutting and Grafting). (01P)
3. Study of artificial plant propagation methods- Part II (Air layering and Budding). (01P)
4. Study of flower and foliage plant used in flower arrangement - Part I (Cut flowers). (01P)
5. Study of flower and foliage plant used in flower arrangement- Part II (loose flowers). (01P)
6. Study of different method of storage and packaging of flowering crop - Part I (01P)
7. Study of different method of storage and packaging of flowering crop- Part II (01P)
8. Study of different materials used in flower arrangement (Floral foams, Vase, Floral pins). (01P)
9. Preparation of flower arrangement - Part I (Western type: Round, Symmetrical and Asymmetrical) (01p)
10. Preparation of flower arrangement - Part II (Western type: Hogarth, Cascade and Vertical). (01P)

11. Preparation of flower arrangement (Eastern type: Ikebana). (01P)
12. Preparation of garlands, bouquets and button holes. (01P)
13. Preparation of floral wheel and Rangoli. (01P)
14. Study of techniques of preparation of dry flower arrangement - Part I (01P)
15. Study of techniques of preparation of dry flower arrangement - Part II (01P)

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3												
CO 2	3			3									
CO 3	3		3										
CO 4	3												
CO 5		2						3					
CO 6								3					
CO 7			2										

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

CO1. Understand plants used in floriculture.

CO2. Knowledge of horticultural practices of floricultural crops.

CO3. Knowledge of floriculture based industries.

CO4. Knowledge flowers and foliage crop used in flower arrangement.

PO2. Practical, Professional, and Procedural Knowledge

CO5. Create different floral designs.

PO3. Entrepreneurial Mindset and Knowledge

CO3. Knowledge of floriculture based industries.

CO7. Develop entrepreneurship in floriculture.

PO4. Specialized Skills and Competencies

CO2. Knowledge of horticultural practices of floricultural crops.

PO8. Learning How to Learn Skills

CO5. Create different floral designs.

CO6. Take care and precautions during flower arrangement.

Name of the Programme	:	B. Sc. Botany
Program Code	:	USBT
Class	:	F. Y. B. Sc.
Semester	:	II
Course Type	:	Skill Enhancement Course (SEC)
Course Code	:	BOT-154-SEC
Course Title	:	Mushroom Cultivation
No. of Credits	:	02
No. of Teaching Hours	:	60

Course Objectives:

1. To know the nutrient value of mushroom.
2. To study the morphology and types of Mushrooms.
3. To provide hands-on training for the preparation of bed for mushroom cultivation.
4. To know the spawn production technique.
5. To aware the identification of edible and poisonous Mushrooms.
6. To understand the diseases. Post harvesting techniques of mushrooms.
7. To facilitate self-employment and scope of mushroom cultivation in small scale industry.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Get knowledge of nutrient value of mushroom.
- CO2. Acquire knowledge morphology and types of Mushrooms.
- CO3. Get skills of hands-on training for the preparation of bed for mushroom cultivation.
- CO4. Get skills spawn production technique.
- CO5. Understand the difference between edible and poisonous Mushrooms.
- CO6. Get the knowledge of identification of diseases and post harvesting techniques of mushrooms.
- CO7. Get the scope of plant tissue culture expert in self- employment and small scale industry.

Practicals

1. Study of different parts of a typical mushroom & variations in mushroom morphology.
2. Study of sterilization of glassware, equipment's and culture media used in mushroom cultivation.
3. Study of preparation culture media: Potato Dextrose medium, Richards's medium.
4. Study of preparation of spawn: Grain spawn, Straw spawn, Sawdust spawn.
5. Study of preparation of compost and compost formulations.
6. Study of mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves.
7. Study of cultivation of white button mushroom.
8. Study of cultivation of paddy straw mushroom.
9. Study of cultivation of oyster mushroom.
10. Study of cultivation of milky mushroom.
11. Study of nutrients profiling mushroom.
12. Study of medicinal values of mushroom.

13. Study of hands on training in mushroom cultivation farm.
14. Study of diseases of mushrooms and their control measures.
15. One botanical excursion to study mushroom cultivation unit (Visit report is compulsory).

Mapping of Program Outcomes with Course Outcomes

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PO13
CO 1	3												
CO 2	3												
CO 3		3											
CO 4		2		3									
CO 5	3												
CO 6	2			3									
CO 7			3										

Justification for the mapping

PO1. Comprehensive Knowledge and Understanding

- CO1. Get knowledge of nutrient value of mushroom.
- CO2. Acquire knowledge of morphology and types of Mushrooms.
- CO5. Understand the difference between edible and poisonous Mushrooms.
- CO6. Get the knowledge of identification of diseases and post harvesting techniques of mushrooms.

PO2. Practical, Professional, and Procedural Knowledge

- CO3. Get skills of hands-on training for the preparation of bed for mushroom cultivation.
- CO4. Get skills spawn production technique.

PO3. Entrepreneurial Mindset and Knowledge

- CO7. Get self employment in mushroom cultivation.

PO4. Specialized Skills and Competencies

- CO4. Get skills spawn production technique.
- CO6. Get the knowledge of identification of diseases and post harvesting techniques of mushrooms.