



स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड - ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'B++' grade

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण-२०२० नुसार पदवी तृतीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२६-२७ पासून लागू करण्याबाबत.

परिपत्रक

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २२ एप्रिल २०२६ रोजी संपन्न झालेल्या मा.विद्यापरिषद बैठकीतील विषय क्र.०८/६४-२०२६ च्या ठरावानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील राष्ट्रीय शैक्षणिक धोरण-२०२० नुसार पदवी तृतीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२६-२७ पासून लागू करण्यास मा.विद्यापरिषदेने मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील बी.एस्सी. तृतीय वर्षाचे खालील विषयाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२६-२७ पासून लागू करण्यात येत आहे.

01	B.Sc. III Year Botany	10	B.Sc. III Year Biochemistry
02	B.Sc. III Year Chemistry	11	B.Sc. III Year Agriculture Microbiology
03	B.Sc. III Year Mathematics	12	B.Sc. III Year Electronics
04	B.Sc. III Year Zoology	13	B.Sc. III Year Seed Technology
05	B.Sc. III Year Microbiology	14	B.Sc. III Year Horticulture
06	B.Sc. III Year Geology	15	B.Sc. III Year Analytical Chemistry
07	B.Sc. III Year Environment & Earth Science	16	B.Sc. III Year Agrochemical & Fertilizers
08	B.Sc. III Year Statistics	17	B.Sc. III Year Industrial Chemistry
09	B.Sc. III Year Dairy Science	18	B.Sc. III Year Industrial Microbiology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.


'ज्ञानतीर्थ' परिसर,

विष्णुपुरी, नांदेड - ४३१ ६०६.

जा.क्र.:शे-१ / परिपत्रक / पदवी / बीएस्सी / २०२६-२७ / 60

दिनांक : १९.०६.२०२६




सहा कुलसचिव

शैक्षणिक (१-अभ्यासमंडळे) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :-

- १) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
- २) मा. प्र.कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ
- ३) मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
- ४) मा. संचालक, परिक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
- ५) मा. प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.



**SWAMI RAMANAND TEERTHMARATHWADA
UNIVERSITY, NANDED - 431 606 (MS)**



**UNDERGRADUATE PROGRAMME OF
SCIENCE & TECHNOLOGY**

**B.Sc. Third Year
HORTICULTURE
(For Affiliated Colleges)**

**Effective from the Academic year 2026 – 2027
(As per NEP-2020)**

**Framed by
BOARD OF STUDIES IN HORTICULTURE
S.R.T.M. University, Nanded - 431 606**

From the Desk of the Dean, Faculty of Science and Technology

Swami Ramanand Teerth Marathwada University, Nanded, enduring to its vision statement “*Enlightened Student: A Source of Immense Power*”, is trying hard consistently to enrich the quality of science education in its jurisdiction by implementing several quality initiatives. Revision and updating curriculum to meet the standard of the courses at national and international level, implementing innovative methods of teaching-learning, improvisation in the examination and evaluation processes are some of the important measures that enabled the University to achieve *the 3Es, the equity, the efficiency* and *the excellence* in higher education of this region. To overcome the difficulty of comparing the performances of the graduating students and also to provide mobility to them to join other institutions the University has adopted the cumulative grade point average (CGPA) system in the year 2014-2015. Further, following the suggestions by the UGC and looking at the better employability, entrepreneurship possibilities and to enhance the latent skills of the stakeholders the University has adopted the Choice Based Credit System (CBCS) in the year 2018-2019 at graduate and post-graduate level. This provided flexibility to the students to choose courses of their own interests. To encourage the students to opt the world-class courses offered on the online platforms like, NPTEL, SWAYM, and other MOOCS platforms the University has implemented the credit transfer policy approved by its Academic Council and also has made a provision of reimbursing registration fees of the successful students completing such courses.

SRTM University has been producing a good number of high calibre graduates; however, it is necessary to ensure that our aspiring students are able to pursue the right education. Like the engineering students, the youngsters pursuing science education need to be equipped and trained as per the requirements of the R&D institutes and industries. This would become possible only when the students undergo studies with an updated and evolving curriculum to match global scenario.

Higher education is a dynamic process and in the present era the stakeholders need to be educated and trained in view of the self-employment and self-sustaining skills like start-ups. Revision of the curriculum alone is not the measure for bringing reforms in the higher education, but invite several other initiatives. Establishing industry-institute linkages and initiating internship, on job training for the graduates in reputed industries are some of the important steps that the University would like to take in the coming time. As a result, revision of the curriculum was the need of the hour and such an opportunity was provided by the New Education Policy 2020. National Education Policy 2020 (NEP 2020) aims at equipping students with knowledge, skills, values, leadership qualities and initiates them for lifelong

learning. As a result the students will acquire expertise in specialized areas of interest, kindle their intellectual curiosity and scientific temper, and create imaginative individuals.

The curriculum given in this document has been developed following the guidelines of NEP-2020 and is crucial as well as challenging due to the reason that it is a transition from general science based to the discipline-specific-based curriculum. All the recommendations of the *Sukanu Samiti* given in the **NEP Curriculum Framework-2023** have been followed, keeping the disciplinary approach with rigor and depth, appropriate to the comprehension level of learners. All the Board of Studies (BoS) under the Faculty of Science and Technology of this university have put in their tremendous efforts in making this curriculum of international standard. They have taken care of maintaining logical sequencing of the subject matter with proper placement of concepts with their linkages for better understanding of the students. We take this opportunity to congratulate the Chairman (s) and all the members of various Boards of Studies for their immense contributions in preparing the revised curriculum for the benefits of the stakeholders in line with the guidelines of the **Government of Maharashtra regarding NEP-2020**. We also acknowledge the suggestions and contributions of the academic and industry experts of various disciplines.

We are sure that the adoption of the revised curriculum will be advantageous for the students to enhance their skills and employability. Introduction of the mandatory *On Job Training, Internship program* for science background students is praise worthy and certainly help the students to imbibe first hand work experience, team work management. These initiatives will also help the students to inculcate the workmanship spirit and explore the possibilities of setting up of their own enterprises.

Dr. M. K. Patil

Dean

Faculty of Science and Technology

Swami Ramanand Teerth Marathwada University, Nanded

From Desk of Chairman, Board of Studies of the Subject Horticulture

PREAMBLE

The B.Sc. Horticulture semester pattern course is running in different affiliated colleges of the S.R.T.M.U. Nanded. The program is designed to encourage and support the growing demands and challenging trends in the academic environment. Our training focuses on holistic development of students to face the competitive world. The course content has been designed on NEP-2020 pattern. The program consists of Major (C), Minor (M), Generic Electives (GE), Vocational and Skill Enhancement Course (VSEC). The course content of each theory paper is divided into four units by giving appropriate titles and subtitles. For each unit, total number of periods required, weightage of maximum marks and credits are mentioned. A list of practical exercises for laboratory course work based on theory papers to be completed in the academic year is also given. A list of selected reading material and a common skeleton question paper for all the theory papers of semester-I & II are also provided at the end of the syllabus.

The programme also inculcates various attributes at the Honours level. These attributes encompass values related to emotional stability, social justice, creative and critical thinking, well-being and various skills required for employability, thus preparing students for continuous learning and sustainability. The new curriculum based on learning outcomes of BSc (Honours) Horticulture offers knowledge of areas including Plant Systematics, Plant Biotechnology, Agronomy, Soil Science, Genetics, Ecology, Conservation biology, Physiology and Bioinformatics, Medicinal and Aromatic plants, Plant diseases and pest management, Agricultural engineering, Plant growth regulators and Nursery Management, Olericulture, Pomology, Floriculture, Post-harvest technology, Spices and Condiment crops etc. The courses define clearly the objectives and the learning outcomes, enabling students to choose the elective subjects broadening their skills in the field of Horticulture. The course also offers skills to pursue research and teaching in the field of Horticulture and thus would produce best minds to meet the demands of society. This curriculum framework for the bachelor-level program in Horticulture is developed keeping in view of the student-centric learning pedagogy, which is entirely outcome-oriented and curiosity-driven. To avoid a rote-learning approach and foster imagination, the curriculum is more leaned towards self-discovery of concepts. The curriculum framework focuses on the pragmatist approach whereby practical application of theoretical concepts is taught with substantial coverage of practical and field works. The addition of Generic Electives, Vocational and Skill Enhancement Courses aims to develop skills in plant sciences and practical experience in the students.

OBJECTIVES OF THE B. Sc. HORTICULTURE PROGRAMME:

The Objectives of this program are:

1. Understand the scope and importance of discipline.
2. In still a love and curiosity for nature through living plants, cultivation and conservation.
3. To make students open-minded and curious, we try our best to nurture and develop scientific Attitude.
4. We make students fit for society by enabling them to work hard.
5. Make the students exposed to the diverse life forms.
6. Make them skilled in practical work, experiments, laboratory equipment and to interpret correctly on biological materials and data.
7. Develop interest in Biological research.
8. Encourage students to research related topics.
9. Develop a thirst for protecting natural resources and the environment.
10. Develop the ability to use the knowledge acquired in various spheres of life to make our country self-reliant
11. Appreciate and apply ethical principles to biological science research and practice.

PROGRAM SPECIFIC OUTCOMES (PSO) OF B.Sc. HORTICULTURE:

By the end of the program the students will be able to:

- PO1:** Skill development for the proper description using botanical terms, identification, naming and classification of life forms especially plants, their soil and climatic requirements.
- PO2:** Acquisition of knowledge on structure, life cycle and life processes that exist among plant and microbial diversity through certain model organism studies.
- PO3:** Understanding of various interactions that exist among plants and available resources; to develop the curiosity on the dynamicity of nature.
- PO4:** Understanding of the major elements of variation that exist in the living world through comparative morphological and anatomical study.
- PO5:** Ability to explain the diversity and evolution based on the empirical evidences in morphology, anatomy, embryology, physiology, biochemistry, molecular biology and life history, cultivation practices of horticultural crops.
- PO6:** Skill development for the collection, preservation and recording of information after observation and analysis- from simple illustration to molecular database development.

- PO7:** Making aware of the scientific and technological advancements- Information and Communication, Biotechnology and Molecular Biology for further learning and research in all branches of Horticulture.
- PO8:** Internalization of the concept of conservation and evolution through the channel of spirit of inquiry.
- PO9:** To enable the graduates to prepare for national as well as international level competitive examinations like UGC-CSIR, UPSC etc.
- PO10:** To enable the students for practicing the best teaching pedagogy as a biology teacher including the latest digital modules.
- PO11:** The graduates should be knowledgeable and competent enough to appropriately deliver on aspects of global importance like climate change, SDGs, green technologies etc. at the right opportunity.
- PO12:** The graduate should be able to demonstrate sufficient proficiency in the hands-on experimental techniques for their area of specialization within biology during research and in the professional career.
- PO13:** The program enables the students to face NET, SET, MPSC, UPSC and other competitive examinations successfully.

Dr. Parshuram Vitthalrao Pawar
Chairman,
Board of Studies in Horticulture
Swami Ramanand Teerth Marathwada University, Nanded



Details of the Board of Studies Members in the subject Botany under the faculty of Science & Technology of S.R.T.M. University, Nanded

Sr No	Name of the Member	Designation	Address	Contact No.
1.	Dr. Parshuram Vitthalrao Pawar	Chairman	Madhavrao Patil, ACS College, Palam Dist. Parbhani.	9049086295
2	Dr. Sonalkumar Shamsundar Nagarkar	Member	Adarsh College, Hingoli, Tq. & Dist. Hingoli.	9657572981
3	Dr. Shankar Gopinath Yadav	Member	Shivaji Mahavidyalaya, Renapur, Dist. Latur.	9421413520
4	Dr. Shyam Laxmanrao Ingle	Member	H.J.P. college, Himayatnagar, Dist. Nanded.	9881456859
5	Dr. Shivaji Piraji Rakhonde	Member	Sant Tukaram College of Arts and Science, Parbhani	9850175189
6	Dr. Sachin Arvindrao Patil	Invitee Member	Yeshwant Mahavidyalaya, Nanded	9356596159
7	Dr. Laxman Vankat Pimpalalle	Invitee Member	Sanjeevani Mahavidyalaya, Chapoli, Dist. Latur	7972902439
8	Mr. Talhande Darshan Rambhauji	Invitee Member	Sharadchandra College of Arts, Commerce and Science, Tq. Naigaon (Bz.), Dist. Nanded	9730030114



Swami RamanandTeerthMarathwada University, Nanded

Faculty of Science and Technology

Credit Framework for B.Sc.III Year

Multidisciplinary Degree Program with Multiple Entry and Exit

Subject: **HORTICULTURE**(Major)

Year & Level	Sem ester	Major (From the same Faculty)		Minor 1 (From the same Faculty)	Minor 2 (From the same Faculty)	Generic Elective (GE) (select from Basket 3 of Faculties other than Science and Technology)	Vocational & Skill Enhancement Course	Ability Enhancement Course (AEC) (Basket 4) Value Education Courses (VEC) / Indian Knowledge System (IKS) (Basket 5)	FieldProject/ Case Study/ OJT/	Credits	Total Credits
1	2	3		4	5	6	7	8	9	10	11
3 (5.5)	V	SHORCT 1301 (3cr) SHORCT 1302 (3cr) SHORIKS 1303 (2cr) SHORCP 1301 (2cr) SHORCP 1302 (2cr) 12 Credits	Major Elective SHORET 1301 (2cr) SHOREP 1301 (2cr) 04 Credits	--	--	--	SHORVC1301 02 Credits	--	FP/CS SHORFP1301 Or SHORCP1301 04 Credits	22	132
	VI	SHORCT1351 (3cr) SHORCT1352 (3cr) SHORCT 1353 (2cr) SHORCP1351 (2cr) SHORCP1352 (2cr) 12 Credits	Major Elective SHORET 1351 (2cr) SHOREP 1351 (2cr) 04 Credits	--	--	--	SHORVC1351 02 Credits	--	OJT SHOROJ1351 04 Credits	22	
	Cum. Cr.	56		16	08	08	08+4=12	22	08+2=10	44	
<p>Exit option: UG Diploma in Major <u>Horticulture</u> and Minor <u>Horticulture</u> on completion of 88 credits and additional 4 credits NSQF / internship in <u>Horticulture</u></p>											



Teaching Scheme

	Course Code	CourseName	CreditsAssigned			TeachingScheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Major	SHORCT 1301	Production Technology of Spices and Condiment Crops	03	--	12	03	--
	SHORCT 1302	Production Technology of Medicinal and Aromatic Plants	03	--		03	--
	SHORIKS 1303	Introduction to Ethno-Horticulture (IKS)	02	--		02	--
	SHORCP 1301	Practical Based on SHORCT 1301	-	02		--	04
	SHORCP 1302	Practical Based on SHORCT 1302		02		--	04
Elective	SHORET 1301	Production Technology of Plantation Crops	02	--	04	02	--
	SHOREP 1301	Practical Based on SHORET 1301	-	02		--	04
Vocational Course	SHORVC1301	Urban and Peri Urban Horticulture	--	02	02	--	04
Field Project/ Case Study/ OJT	SHORFP1301 Or SHORCP1301	Field Project/ Case Study	--	04	04	--	08
Total Credits 24			10	12	22	10	24



B. Sc. Third Year Semester V (Level 5.5)

Examination Scheme

[40% Continuous Assessment (CA) and 60% End Semester Assessment (ESA)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	CourseName (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Major	SHORCT 1301	Production Technology of Spices and Condiment Crops	15	15	30	45	--	--	75
	SHORCT 1302	Production Technology of Medicinal and Aromatic Plants	15	15	30	45	--	--	75
	SHORIKS 1303	Indian Knowledge Systems (IKS)	10	10	20	30	--	--	50
	SHORCP 1301	Practical Based on SHORCT 1301	--	--	--	--	20	30	50
	SHORCP 1302	Practical Based on SHORCT 1302	--	--	--	--	20	30	50
Elective	SHORET 1301	Production Technology of Plantation Crops	10	10	20	30	20	30	50
	SHOREP 1301	Practical Based on SHORET 1301	--	--	--	--	20	30	50
Vocational Course	SHORVC1301	Urban and Peri Urban Horticulture	--	--	--	--	20	30	50
Field Project/ Case Study/ OJT	SHORFP1301 Or SHORCP1301	Field Project/ Case Study	--	--	--	--	40	60	100



B. Sc. Third Year Semester VI (Level 5.5)

Teaching Scheme

	Course Code	CourseName	CreditsAssigned			TeachingScheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Major	SHORCT 1351	Post Harvest Handling of Horticultural Crops	03	--	12	03	--
	SHORCT 1352	Processing of Horticultural Crops	03	--		03	--
	SHORCT 1353	Protected Cultivation of Vegetable Crops	02	--		02	--
	SHORCP 1351	Practical Based on SHORCT 1351	-	02		--	04
	SHORCP 1352	Practical Based on SHORCT 1352		02		--	04
Elective	SHORET 1351	Protected Cultivation of Commercial Flowers	02	--	04	02	--
	SHOREP 1351	Practical Based on SHORET 1351	-	02		--	04
Vocational Course	SHORVC1351	Application of Plant Growth Regulators in Horticultural Crops	--	02	02	--	04
Field Project/ Case Study/ OJT	SHOROJ1351	OJT	--	04	04	--	08
Total Credits 24			10	12	22	10	24



B. Sc. Third Year Semester VI (Level 5.5)

Examination Scheme

[40% Continuous Assessment (CA) and 60% End Semester Assessment (ESA)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	CourseName (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Major	SHORCT 1351	Post Harvest Handling of Horticultural Crops	15	15	30	45	--	--	75
	SHORCT 1352	Processing of Horticultural Crops	15	15	30	45	--	--	75
	SHORCT 1353	Protected Cultivation of Vegetable Crops	10	10	20	30	--	--	50
	SHORCP 1351	Practical Based on SHORCT 1351	--	--	--	--	20	30	50
	SHORCP 1352	Practical Based on SHORCT 1352	--	--	--	--	20	30	50
Elective	SHORET 1351	Protected Cultivation of Commercial Flowers	10	10	20	30	20	30	50
	SHOREP 1351	Practical Based on SHORET 1351	--	--	--	--	20	30	50
Vocational Course	SHORVC1351	Application of Plant Growth Regulators in Horticultural Crops	--	--	--	--	20	30	50
Field Project/ Case Study/ OJT	SHOROJ1351	OJT	--	--	--	--	40	60	100

Syllabus for B. Sc. Horticulture
Third Year
Semester – V
As Per National Education Policy- 2020

To be implemented from
Academic Year 2026-2027

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - V)
Major Core Theory Course
Course Code – SHORCT1301

Title of the Course: PRODUCTION TECHNOLOGY OF SPICES AND CONDIMENT CROPS

[No. of Credits: 3 Credit] [Total:45 Hours]

Course pre-requisite:

1. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
2. The students should have basic knowledge of plant science.

Course objectives:

1. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
2. To study the types of classifications- artificial, natural and phylogenetic
3. To study the principles and rules of ICN and taxonomical terminology.
4. To study the various plant families and their economic importance.

Course outcomes:

1. The students understand the morphology, classification, and evolution of flowering plants.
2. The students differentiate between various families of flowering plants and their collection and preservation.
3. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORCT 1301-Production Technology of Spices and Condiment Crops

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Production Technology of Major Rhizome, Seed and Plantation Spice	12
	1.1	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Turmeric crop.	
	1.2	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Coriander crop.	

	1.3	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Cardamom crop.	
2.0		Production Technology of Important Seed and Tree Spices	
	2.1	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Ginger crop.	11
	2.2	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Fenugreek crop.	
	2.3	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Clove crop.	
	2.4	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Cumin crop.	
3.0		Production Technology of Commercial Spice and Condiment Crops	
	3.1	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Chilli crop.	10
	3.2	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Mustard crop.	
	3.3	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Curry Leaf crop.	

	3.4	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Black pepper crop.	
4.0		Production Technology of Bulb and High-Value Spices	
	4.1	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Garlic crop.	
	4.2	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of All spice crop.	
	4.3	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Saffron crop.	12
	4.4	Geographical distribution of spices and condiments, area, production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, aftercare, manures and fertilizers, irrigation, processing, harvesting, grading, packing and marketing of Nutmeg crop.	
		Total	45

Text Book and Reference Book:

1. **T.K. Bose, J. Kabir, P. Das & P.P. Joy**
Tropical Horticulture (Vol. II)
2. **K.V. Peter (Ed.)**
Handbook of Herbs and Spices (Vol. 1–3)
3. **K.V. Peter**
Spices: Production, Processing and Value Addition
4. **E.V.V. Bhatt & K.P. Prabhakaran Nair**
Advances in Spices Research
5. **K.P. Prabhakaran Nair**
Agronomy and Economy of Black Pepper and Cardamom
6. **E. V. V. Bhatt & K.P. Prabhakaran Nair**
Spices and Condiments

7. **K.V. Peter & B. Nybe (Eds.)**
Spices: Agronomy and Economy
8. **N. Gopalakrishnan**
Spices and Plantation Crops
9. **ICAR (Indian Council of Agricultural Research)**
Package of Practices for Spices Crops
10. **R. Pradeepkumar**
Spices Crops Production and Management
11. **Bose, T.K. & Som, M.G.**
Vegetable Crops in India (for coriander, fenugreek, chilli, etc.)

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - V)
Major Core Practical Course
Course Code – SHORCP 1301

Title of the Course: Practical Based on SHORCT 1301

[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

1. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
2. The students should have basic knowledge of plant science.

Course objectives:

1. To develop skill and technique among the students to study morphology and classification of plants.
2. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
3. To differentiate between families of flowering plants.

Course outcomes:

1. Students develop skill to study the flowering plants.
2. The students understand the morphology and classification of flowering plants.
3. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHORCP 1301: Practical Based on SHORCT 1301

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of morphology and identification of Turmeric, Coriander and Cardamom	4
2.	Study of geographical distribution and production status of major spices in India	4
3.	Study of soil and climatic requirements of Turmeric, Coriander and Cardamom	4
4.	Study of propagation methods and planting techniques in Turmeric and Cardamom	4
5.	Study of nursery raising and seed treatment in Ginger and Fenugreek	4
6.	Study of varieties and varietal characteristics of major spice crops	4
7.	Study of manures and fertilizers application in Ginger and Cumin	4
8.	Study of irrigation management practices in spice crops	4
9.	Study of transplanting techniques and spacing in Chilli cultivation	4
10.	Study of intercultural operations and weed management in spice crops	4

11.	Study of major pests and diseases of Chilli and Black Pepper and their management	4
12.	Study of harvesting indices and yield estimation in spice crops	4
13.	Study of post-harvest processing techniques in Turmeric and Ginger	4
14.	Study of grading, packaging and storage of spices and condiments	4
15.	Study of marketing channels and export potential of spices in India	4
	Total	60

Text Books and Reference Books:

1. **K.V. Peter**
Spices: Production, Processing and Value Addition
2. **T.K. Bose, J. Kabir, P. Das & P.P. Joy**
Tropical Horticulture (Vol. II)
3. **R. Pradeepkumar**
Spices Crops Production and Management
4. **ICAR**
Practical Manual of Horticultural Crops
5. **ICAR (Directorate of Knowledge Management in Agriculture)**
e-Course: Spices, Plantation, Medicinal and Aromatic Crops
6. **K.P. Prabhakaran Nair**
The Agronomy and Economy of Turmeric and Ginger
7. **K.V. Peter & B. Nybe (Eds.)**
Spices: Agronomy and Economy
8. **E.V.V. Bhatt & K.P. Prabhakaran Nair**
Spices and Condiments
9. **N. Gopalakrishnan**
Spices and Plantation Crops
10. **ICAR**
Handbook of Agriculture (Spices section)

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - V)
Major Core Theory Course
Course Code – SHORCT1302

Title of the Course: PRODUCTION TECHNOLOGY OF MEDICINAL AND AROMATIC PLANTS
[No. of Credits: 3 Credit] [Total:45 Hours]

Course pre-requisite:

3. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
4. The students should have basic knowledge of plant science.

Course objectives:

5. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
6. To study the types of classifications- artificial, natural and phylogenetic
7. To study the principles and rules of ICN and taxonomical terminology.
8. To study the various plant families and their economic importance.

Course outcomes:

4. The students understand the morphology, classification, and evolution of flowering plants.
5. The students differentiate between various families of flowering plants and their collection and preservation.
6. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORCT 1302-Production Technology of Medicinal and Aromatic Plants

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Production Technology of Tuber and Alkaloid-bearing Medicinal Plants	
	1.1	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Dioscorea medicinal plant.	12
	1.2	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Rauwolfia medicinal plant.	
	1.3	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Opium medicinal plant.	
2.0		Production Technology of Commercial Medicinal Plants	
	2.1	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Periwinkle medicinal plant.	11

2.2	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Aloe medicinal plant.	
2.3	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Guggal medicinal plant.	
2.4	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Plantago medicinal plant.	
3.0	Production Technology of Industrial and Herbal Medicinal Crops	
3.1	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Coleus medicinal plant.	
3.2	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Stevia medicinal plant.	10
3.3	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Senna medicinal plant.	
3.4	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Solanum medicinal plant.	
4.0	Production Technology of Aromatic and Tree Medicinal Plants	
4.1	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Sandalwood medicinal plant.	
4.2	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Mehendi medicinal plant.	12
4.3	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Mint medicinal plant.	
4.4	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Lemon grass medicinal plant.	
	Total	45

Text Books and Reference Books:

1. **K. V. Peter (Ed.)**
Handbook of Herbs and Spices (Vol. 1–3)
2. **E.A. Weiss**
Essential Oil Crops
3. **V.K. Gupta**
Medicinal and Aromatic Plants
4. **H.P. Singh, S. P. S. Khanuja, M. P. S. Katiyar & S. P. S. Saini**
Cultivation of Medicinal and Aromatic Crops
5. **Farooqi, A.A. & Sreeramu, B.S.**
Cultivation of Medicinal and Aromatic Crops
6. **Farooqi, A.A., Sreeramu, B.S. & Srinivasappa, K.N.**
Cultivation of Medicinal and Aromatic Crops (Revised Edition)
7. **K.P. Prabhakaran Nair**
Medicinal Plants in India
8. **S.S. Handa & M.K. Kaul (Eds.)**
Supplement to Cultivation and Utilization of Medicinal Plants
9. **Anonymous (ICAR)**
Handbook of Agriculture (Medicinal & Aromatic Plants section)
10. **Chadha, K.L. & Gupta, R. (Eds.)**
Advances in Horticulture (Medicinal & Aromatic Plants)

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - V)
Major Core Practical Course
Course Code – SHORCP 1302

Title of the Course: Practical Based on SHORCT 1302

[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

3. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
4. The students should have basic knowledge of plant science.

Course objectives:

4. To develop skill and technique among the students to study morphology and classification of plants.
5. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
6. To differentiate between families of flowering plants.

Course outcomes:

4. Students develop skill to study the flowering plants.
5. The students understand the morphology and classification of flowering plants.
6. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHORCP 1302: Practical Based on SHORCT 1302

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of morphology and identification of important medicinal plants (Dioscorea, Rauwolfia and Opium)	4
2.	Study of origin, distribution and economic importance of selected medicinal plants (Dioscorea, Rauwolfia and Opium)	4
3.	Study of propagation methods in medicinal plants (vegetative and seed propagation)	4
4.	Study of cultural practices and nutrient management in medicinal crops	4
5.	Study of nursery raising and planting techniques in medicinal and aromatic plants	4
6.	Study of water management practices in medicinal plants	4
7.	Study of harvesting stages and methods in medicinal crops	4
8.	Study of post-harvest processing techniques in medicinal plants	4
9.	Study of varieties and phytochemical importance of medicinal plants	4
10.	Study of plant growth and development under different cultural practices	4

11.	Study of drying, storage and preservation methods of medicinal plants	4
12.	Study of quality parameters and grading of medicinal plant produce	4
13.	Study of essential oil extraction methods in aromatic plants (Mint and Lemongrass)	4
14.	Study of marketing channels and export potential of medicinal and aromatic plants	4
15.	Study of economic analysis and cost of cultivation of selected medicinal plants	4
	Total	60

Text Books and Reference Books:

1. **A.A. Farooqi & B.S. Sreeramu**
Cultivation of Medicinal and Aromatic Crops
2. **H.P. Singh, S.P.S. Khanuja, M.P.S. Katiyar & S. P. S. Saini**
Cultivation of Medicinal and Aromatic Plants
3. **V.K. Gupta**
Medicinal and Aromatic Plants
4. **ICAR**
Practical Manual of Medicinal and Aromatic Plants
5. **K. V. Peter (Ed.)**
Handbook of Herbs and Spices
6. **K.P. Prabhakaran Nair**
Medicinal Plants in India
7. **E.A. Weiss**
Essential Oil Crops
8. **S.S. Handa & M.K. Kaul (Eds.)**
Cultivation and Utilization of Medicinal Plants
9. **Chadha, K.L. & Gupta, R. (Eds.)**
Advances in Horticulture (Medicinal & Aromatic Plants)
10. **Anonymous (ICAR)**
Handbook of Agriculture

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - V)
Major Core Theory Course
Course Code – SHORIKS 1303

Title of the Course: Introduction to Ethno-Horticulture (IKS)

[No. of Credits: 2 Credit] [Total:30Hours]

Course pre-requisite:

5. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
6. The students should have basic knowledge of plant science.

Course objectives:

9. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
10. To study the types of classifications- artificial, natural and phylogenetic
11. To study the principles and rules of ICN and taxonomical terminology.
12. To study the various plant families and their economic importance.

Course outcomes:

7. The students understand the morphology, classification, and evolution of flowering plants.
8. The students differentiate between various families of flowering plants and their collection and preservation.
9. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORIKS 1303-Indian Knowledge Systems

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Introduction to Ethno-Horticulture	08
	1.1	Concept, definition and scope of Ethno-Horticulture	
	1.2	Distinction between Ethnobotany and Ethno-Horticulture	
	1.3	Indian Knowledge System (IKS) in horticulture: philosophical and agricultural foundations	
	1.4	Role of indigenous communities in domestication, selection, conservation and traditional knowledge transmission in horticultural crops	
2.0		Indigenous Horticultural Crop Diversity of India	07
		Study of selected indigenous horticultural crops with reference to center of origin, region of diversity, important landraces and traditional production systems.	

	2.1	Indigenous Fruit Crops <i>Mangifera indica</i> <i>Citrus reticulata</i> <i>Artocarpus heterophyllus</i>	
	2.2	Indigenous Minor and Underutilized Fruit Crops <i>Syzygium cumini</i> <i>Aegle marmelos</i>	
	2.3	Indigenous Vegetable Crops <i>Solanum melongena</i> <i>Luffa acutangula</i>	
	2.4	Indigenous Spice and Plantation Crops <i>Curcuma longa</i> <i>Piper nigrum</i>	
3.0		Traditional Horticultural Practices	
	3.1	Indigenous Seed Systems Traditional seed selection, preservation and exchange systems in horticultural crops	08
	3.2	Traditional Propagation and Nursery Practices Indigenous methods of vegetative propagation, nursery raising and orchard establishment	
	3.3	Traditional Nutrient and Soil Management Practices Organic inputs in traditional systems (Panchagavya, Jeevamrut and farm-based formulations)	
	3.4	Indigenous Plant Health and Water Management Systems Traditional plant protection practices and indigenous irrigation systems (tank irrigation, step wells)	
4.0		Conservation of Indigenous Horticultural Diversity	
	4.1	In situ and On-farm Conservation of Indigenous Horticultural Crops	
	4.2	Sacred Groves and Traditional Community-based Biodiversity Conservation Systems	
	4.3	Role of Indigenous, Tribal and Rural Communities in Conservation and Sustainable Utilization	
	4.4	Climate resilience, Geographical Indication (GI) and national mechanisms for conservation of indigenous horticultural germplasm	
		Total	30

Text Books and Reference Books:

1. Altieri, M.A. (2018). *Agroecology: The Science of Sustainable Agriculture*. CRC Press, Boca Raton.
2. Balick, M.J. and Cox, P.A. (2020). *Plants, People and Culture: The Science of Ethnobotany*. CRC Press, USA.
3. Bose, T.K., Mitra, S.K. and Sanyal, D. (1999). *Fruits: Tropical and Subtropical*. Naya Udyog, Kolkata.
4. Bose, T.K. and Som, M.G. (1986). *Vegetable Crops in India*. Naya Prokash, Kolkata.
5. Chadha, K.L. (Ed.) (2002). *Handbook of Horticulture*. ICAR, New Delhi.
6. De Candolle, A. (1967 reprint). *Origin of Cultivated Plants*. Hafner Publishing, New York.
7. Dhillon, B.S., Tyagi, R.K., Saxena, S. and Randhawa, G.J. (2004). *Plant Genetic Resources: Horticultural Crops*. Narosa Publishing House, New Delhi.
8. Government of India (2002). *Biological Diversity Act*. Ministry of Environment & Forests, New Delhi.
9. Government of India (2003). *Geographical Indications of Goods (Registration and Protection) Act Manual*.

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester -V)
 Major Elective Theory Course
 Course Code – **SHORET1301**

Title of the Course: Production Technology of Plantation Crops

[No. of Credits: 2 Credit] [Total:30 Hours]

Course pre-requisite:

7. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
8. The students should have basic knowledge of plant science.

Course objectives:

13. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
14. To study the types of classifications- artificial, natural and phylogenetic
15. To study the principles and rules of ICN and taxonomical terminology.
16. To study the various plant families and their economic importance.

Course outcomes:

10. The students understand the morphology, classification, and evolution of flowering plants.
11. The students differentiate between various families of flowering plants and their collection and preservation.
12. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORET 1301 Production Technology of Plantation Crops

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Introduction and Coconut & Arecanut	8
	1.1	Importance, scope and classification of plantation crops in India	
	1.2	History, origin, distribution, propagation, cultural practices, nutrition and water management of Coconut crop.	
	1.3	harvesting, processing and marketing of Coconut crop.	
2.0	1.4	History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Arecanut crop.	7
		Cashewnut and Oil palm	
	2.1	History, origin, distribution, propagation, cultural practices, nutrition and water management of Cashewnut crop.	
	2.2	harvesting, processing and marketing of Cashewnut crop.	7
	2.3	History, origin, distribution, propagation, cultural practices, nutrition and water management of Oil palm crop.	

	2.4	harvesting, processing and marketing of Oil palm crop.	
3.0		Tea and Coffee	
	3.1	History, origin, distribution, propagation, cultural practices, nutrition and water management of Tea crop.	7
	3.2	harvesting, processing and marketing of Tea crop.	
	3.3	History, origin, distribution, propagation, cultural practices, nutrition and water management of Coffee crop.	
	3.4	harvesting, processing and marketing of Coffee crop.	
4.0		Cocoa and Rubber	
	4.1	History, origin, distribution, propagation, cultural practices, nutrition and water management of Cocoa crop.	8
	4.2	harvesting, processing and marketing of Cocoa crop.	
	4.3	History, origin, distribution, propagation, cultural practices, nutrition and water management of Rubber crop.	
	4.4	harvesting, processing and marketing of Rubber crop.	
		Total	30

Text Books and Reference Books:

1. **K. V. Peter**
Basics of Horticulture
2. **T.K. Bose, J. Kabir, P. Das & P.P. Joy**
Tropical Horticulture (Vol. I)
3. **K.P. Prabhakaran Nair**
The Agronomy and Economy of Important Tree Crops of the Developing World
4. **A. K. Mitra (Ed.)**
Plantation Crops
5. **S. Nedunchezhiyan & R. Rajendran**
Plantation Crops
6. **K.P. Prabhakaran Nair**
Agronomy and Economy of Coconut and Arecanut
7. **K.P. Prabhakaran Nair**
The Agronomy and Economy of Black Pepper, Cardamom, Tea and Coffee
8. **P.J. Gregory**
The Tea Plantations of India
9. **R.H.M.J. Lemmens & N. Wulijarni-Soetjipto**
Plant Resources of South-East Asia (PROSEA) – Plantation Crops
10. **Anonymous (ICAR)**
Handbook of Agriculture (Plantation Crops section)

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester -V)
Major Elective Practical Course
Course Code – SHOREP 1301

Title of the Course: Practical Based on SHORET 1301

[No. of Credits: 2 Credit] [Total:60Hours]

Course pre-requisite:

5. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
6. The students should have basic knowledge of plant science.

Course objectives:

7. To develop skill and technique among the students to study morphology and classification of plants.
8. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
9. To differentiate between families of flowering plants.

Course outcomes:

7. Students develop skill to study the flowering plants.
8. The students understand the morphology and classification of flowering plants.
9. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHOREP 1301: Practical Based on SHORET 1301

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of morphology and identification of Coconut and Arecanut	4
2.	Study of origin, distribution and economic importance of plantation crops	4
3.	Study of soil and climatic requirements of Coconut and Arecanut	4
4.	Study of propagation methods and nursery management in Coconut and Arecanut	4
5.	Study of varieties and varietal characteristics of Oil Palm and Cashew	4
6.	Study of planting systems and spacing in plantation crops	4
7.	Study of intercultural operations in Oil Palm and Cashew cultivation	4
8.	Study of irrigation and nutrient management in plantation crops	4
9.	Study of nursery raising and planting techniques in Tea and Coffee	4
10.	Study of training and pruning practices in Tea and Coffee	4
11.	Study of harvesting methods and yield estimation in Tea and Coffee	4

12.	Study of primary processing methods of Tea and Coffee	4
13.	Study of propagation and planting techniques in Cocoa and Rubber	4
14.	Study of tapping methods in Rubber and harvesting techniques in Cocoa	4
15.	Study of processing and marketing of plantation crops	4
	Total	60

Text Books and Reference Books:

1. **T.K. Bose, J. Kabir, P. Das & P.P. Joy**
Tropical Horticulture (Vol. I)
2. **K. V. Peter**
Basics of Horticulture
3. **A.K. Mitra (Ed.)**
Plantation Crops
4. **S. Nedunchezhiyan & R. Rajendran**
Plantation Crops
5. **ICAR**
Practical Manual of Horticultural Crops
6. **K.P. Prabhakaran Nair**
The Agronomy and Economy of Important Tree Crops of the Developing World
7. **K.P. Prabhakaran Nair**
The Coconut Palm
8. **K.P. Prabhakaran Nair**
Agronomy and Economy of Plantation Crops
9. **K.C. Willson & M.N. Clifford**
Tea: Cultivation to Consumption
10. **R.J. Clarke & O.G. Vitzthum**
Coffee: Recent Developments

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester -V)
VSC Course
Course Code – SHORVC 1301

Title of the Course: Urban and Peri Urban Horticulture

[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

7. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
8. The students should have basic knowledge of plant science.

Course objectives:

10. To develop skill and technique among the students to study morphology and classification of plants.
11. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
12. To differentiate between families of flowering plants.

Course outcomes:

10. Students develop skill to study the flowering plants.
11. The students understand the morphology and classification of flowering plants.
12. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHORVC 1301: Urban and Peri Urban Horticulture

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of different models of urban horticulture (terrace garden, kitchen garden, vertical garden).	4
2.	Identification of vegetables and ornamental plant suitable for urban cultivation.	4
3.	Preparation of growing media using soil, compost and cocopeat.	4
4.	Planting of vegetables in containers and grow bags.	4
5.	Planting of ornamental plants in containers and grow bags.	4
6.	Layout and design of terrace garden.	4
7.	Layout and design of kitchen gardens.	4
8.	Preparation of compost and vermicompost using household organic waste.	4
9.	Installation of simple drip irrigation system for terrace gardening.	4
10.	Propagation of horticultural plants suitable for urban cultivation.	4
11.	Identification and management of common pests and diseases in urban gardens.	4
12.	Preparation and use of organic manures and biofertilizers.	4

13.	Recycling of organic waste	4
14.	Economic analysis of small-scale urban horticulture systems.	4
15.	Visit to urban cultivation unit	4
	Total	60

Text Books and Reference Books:

1. **K. V. Peter**
Basics of Horticulture
2. **T.K. Bose, J. Kabir, P. Das & P.P. Joy**
Tropical Horticulture
3. **S. S. Ghosh**
Urban Horticulture
4. **R. Pradeepkumar**
Horticulture Science Series (Vol. on Vegetables & Landscaping)
5. **ICAR**
Practical Manual of Horticultural Crops
6. **D. K. Singh**
Modern Vegetable Production
7. **N. Kumar**
Introduction to Horticulture
8. **Bose, T.K. & Mukherjee, D.**
Gardening in India
9. **K. V. Peter (Ed.)**
Handbook of Horticulture
10. **Chadha, K.L.**
Handbook of Horticulture
11. **S. P. Mukherjee**
Fundamentals of Horticulture
12. **Yellamanda Reddy & G.H. Sankara Reddy**
Principles of Agronomy (for nutrient, irrigation, economics)

Semester – VI

B.Sc. III Year

Horticulture

As Per National Education Policy- 2020

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - VI)
Major Core Theory Course
Course Code – SHORCT1351

Title of the Course: POST HARVEST HANDLING OF HORTICULTURAL CROPS
[No. of Credits: 3 Credit] [Total:45Hours]

Course pre-requisite:

9. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
10. The students should have basic knowledge of plant science.

Course objectives:

17. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
18. To study the types of classifications- artificial, natural and phylogenetic
19. To study the principles and rules of ICN and taxonomical terminology.
20. To study the various plant families and their economic importance.

Course outcomes:

13. The students understand the morphology, classification, and evolution of flowering plants.
14. The students differentiate between various families of flowering plants and their collection and preservation.
15. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORCT 1351-Post Harvest Handling of Horticultural Crops

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Introduction to Post Harvest Handling	12
	1.1	Importance of Post Harvest Handling	
	1.2	Maturity and maturity indices of fruit crops	
	1.3	Maturity and maturity indices of vegetable crops	
	1.4	Harvesting methods of Horticultural crops	
2.0		Factors responsible for Maturity, Ripening and Deterioration of Horticultural crops	11
	2.1	Pre harvest factors Part I i) Selection of varieties ii) Cultural operations	
	2.2	Pre harvest factors Part II i) Pre harvest treatments ii) Maturity iii) Harvesting	

	2.3	Post harvest factors Part I i) Curing ii) Degreening iii) Pre cooling iv) Washing and drying	
	2.4	Post harvest factors Part II i) Storing and grading ii) Disinfestation iii) Post harvest treatments iv) Waxing	
3.0		Methods used for hastening and delaying ripening	
	3.1	Chemical that hasten ripening	10
	3.2	Chemicals that delay in ripening	
	3.3	Respiration and Transpiration in relation to Harvesting,	
	3.4	Packing, Transportation and Storage	
4.0		1. Nature and causes of deterioration and control measures	
	4.1	Primary causes of losses i) Mechanical losses ii) Physio –biochemical losses iii) Microbial losses iv) Physical losses	12
	4.2	Secondary causes of losses i) Socio economic factors, ii) Lack of training, iii) Marketing	
	4.3	Methods of pre Cooling, Grading,	
	4.4	Packaging, Storage and Transport of Horticultural crops	
		Total	45

Text Books and Reference Books:

1. **K. V. Peter**
Post-Harvest Technology of Horticultural Crops
2. **A.M. Kader (Ed.)**
Postharvest Technology of Horticultural Crops
3. **T.K. Bose & S.K. Mitra**
Fruits: Post Harvest Technology
4. **R. Pradeepkumar**
Post Harvest Technology of Horticultural Crops

5. **ICAR**
Handbook of Horticulture
6. **Wills, McGlasson, Graham & Joyce**
Postharvest: An Introduction to the Physiology and Handling of Fruit and Vegetables
7. **S. Pandey & S.K. Joshy**
Post Harvest Technology and Engineering of Horticultural Crops
8. **A. Chakraverty, A.S. Mujumdar, G.S.V. Raghavan & H.S. Ramaswamy**
Handbook of Postharvest Technology
9. **Kader, A.A.**
Handling of Horticultural Crops
10. **S.K. Roy**
Post Harvest Technology of Fruits and Vegetables

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - V)
Major Core Practical Course
Course Code – SHORCP 1351

Title of the Course: Practical Based on SHORCT 1305

[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

9. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
10. The students should have basic knowledge of plant science.

Course objectives:

13. To develop skill and technique among the students to study morphology and classification of plants.
14. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
15. To differentiate between families of flowering plants.

Course outcomes:

13. Students develop skill to study the flowering plants.
14. The students understand the morphology and classification of flowering plants.
15. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHORCP 1351: Practical Based on SHORCT 1351

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of maturity indices of major horticultural crops	4
2.	Study of harvesting methods of fruits and vegetables	4
3.	Study of pre-harvest factors affecting quality of horticultural produce	4
4.	Study of post-harvest operations: curing, Degreening, pre-cooling, washing and drying	4
5.	Study of grading and standardization of horticultural produce	4
6.	Study of packaging materials and methods for horticultural crops	4
7.	Study of storage methods (ambient, cold storage and controlled atmosphere storage)	4
8.	Study of ripening processes and factors affecting ripening in fruits	4
9.	Study of chemicals used for hastening ripening (e.g., ethylene application)	4
10.	Study of chemicals used for delaying ripening and senescence	4
11.	Study of respiration and transpiration rates in harvested produce	4

12.	Study of physiological changes during ripening and storage	4
13.	Study of post-harvest losses and their types (mechanical, microbial, physiological, physical)	4
14.	Study of control measures to reduce post-harvest losses	4
15.	Study of pre-cooling methods (hydrocooling, forced air cooling, icing, etc.)	4
	Total	60

Text Books and Reference Books:

1. **K. V. Peter**
Post-Harvest Technology of Horticultural Crops
2. **A.A. Kader (Ed.)**
Postharvest Technology of Horticultural Crops
3. **R. Pradeepkumar**
Post Harvest Technology of Horticultural Crops
4. **T.K. Bose & S.K. Mitra**
Fruits: Post Harvest Technology
5. **ICAR**
Practical Manual of Horticultural Crops

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - VI)
Major Core Theory Course
Course Code – SHORCT1352

Title of the Course: Processing of Horticultural Crops

[No. of Credits: 3 Credit] [Total:45 Hours]

Course pre-requisite:

11. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
12. The students should have basic knowledge of plant science.

Course objectives:

21. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
22. To study the types of classifications- artificial, natural and phylogenetic
23. To study the principles and rules of ICN and taxonomical terminology.
24. To study the various plant families and their economic importance.

Course outcomes:

16. The students understand the morphology, classification, and evolution of flowering plants.
17. The students differentiate between various families of flowering plants and their collection and preservation.
18. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORCT 1352-Processing of Horticultural Crops

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Introduction to Food Preservation	
	1.1	History of Food Preservation	12
	1.2	Importance and Scope of Fruit and Vegetable Preservation	
	1.3	Selection of Site for Fruits and Vegetables Preservation Unit	
	1.4	Principles and Methods of Preservation	
2.0		Types of Food Preservation	
	2.1	Dehydration of Fruits and Vegetables	12
	2.2	Canning of Vegetables	
	2.3	Food Preservatives	
	2.4	Colours and Flavours used in Food Industry	
3.0		Preparation of fruit products	
	3.1	Mango pulp	11

	3.2	Papaya jam	
	3.3	Grape juice and Apple jelly	
	3.4	Citrus squash & marmalade	
4.0		Preparation of vegetable products	
	4.1	Tomato juice	10
	4.2	Tomato sauce	
	4.3	Garlic and Ginger paste	
	4.4	Chilli pickle and Mixed Vegetable Pickle	
		Total	45

Text Books and Reference Books:

1. Post-Harvest Management and Processing of Fruits and Vegetables
N. S. Rathore, G. K. Mathur and S. S. Chasta
2. Preservation of Fruits and Vegetables
ICAR (Indian Council of Agricultural Research)
3. Processing of Horticultural Crops (e-Course)
ICAR
4. Fruit and Vegetable Preservation: Principles and Practices
R. P. Srivastava and Sanjeev Kumar
5. Preservation of Fruits and Vegetables
Girdhari Lal
6. Postharvest Management and Production of Important Horticultural Crops
Amit Nath, Shukadev Mangaraj, T. K. Goswami and J. Chauhan
7. Fruits and Vegetables Technologies: Postharvest Processing and Packaging
O. P. Chauhan (Editor)

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - VI)
Major Core Practical Course
Course Code – **SBOTCP 1352**

Title of the Course: **Practical Based on SHORCT 1352**

[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

11. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
12. The students should have basic knowledge of plant science.

Course objectives:

16. To develop skill and technique among the students to study morphology and classification of plants.
17. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
18. To differentiate between families of flowering plants.

Course outcomes:

16. Students develop skill to study the flowering plants.
17. The students understand the morphology and classification of flowering plants.
18. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SBOTCP 1352: Practical Based on SBOTCT 1352

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of different methods of food preservation (drying, canning, chemical preservation, refrigeration)	4
2.	Study of principles involved in food preservation (temperature, moisture, microorganisms control)	4
3.	Study of preservatives, colours and flavours used in food processing	4
4.	Study of selection of raw materials and site requirements for processing unit	4
5.	Study of dehydration techniques for fruits and vegetables	4
6.	Study of canning process of vegetables	4
7.	Study of preparation and sterilization of containers for preservation	4
8.	Study of Preparation of mango pulp	4
9.	Study of Preparation of papaya jam	4
10.	Study of Preparation of grape juice	4
11.	Study of Preparation of apple jelly	4

12.	Study of Preparation of citrus squash	4
13.	Study of Preparation of citrus marmalade	4
14.	Study of Preparation of tomato juice	4
15.	Study of Preparation of tomato sauce (ketchup)	4
	Total	60

Text Books and Reference Books:

1. **S. Ranganna**
Handbook of Analysis and Quality Control for Fruit and Vegetable Products
2. **W.B. Cruess**
Commercial Fruit and Vegetable Products
3. **A. Chakraverty, A.S. Mujumdar, G.S.V. Raghavan & H.S. Ramaswamy**
Handbook of Postharvest Technology
4. **K. V. Peter**
Post-Harvest Technology of Horticultural Crops
5. **R. Pradeepkumar**
Processing of Fruits and Vegetables
6. **D.K. Salunkhe & S.S. Kadam**
Handbook of Fruit Science and Technology
7. **Wills, McGlasson, Graham & Joyce**
Postharvest: An Introduction to the Physiology and Handling of Fruit and Vegetables
8. **Fellows, P.J.**
Food Processing Technology: Principles and Practice
9. **Norman N. Potter & Joseph H. Hotchkiss**
Food Science
10. **S.K. Sharma & U.R. Sharma**

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester - VI)
Major Core Theory Course
Course Code – SHORCT1353

Title of the Course: PROTECTED CULTIVATION OF VEGETABLE CROPS

[No. of Credits: 2 Credit] [Total:30 Hours]

Course pre-requisite:

13. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
14. The students should have basic knowledge of plant science.

Course objectives:

25. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
26. To study the types of classifications- artificial, natural and phylogenetic
27. To study the principles and rules of ICN and taxonomical terminology.
28. To study the various plant families and their economic importance.

Course outcomes:

19. The students understand the morphology, classification, and evolution of flowering plants.
20. The students differentiate between various families of flowering plants and their collection and preservation.
21. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORCT1353-Protected Cultivation of Vegetable Crops

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		Fundamentals of Protected Cultivation	
	1.1	Concept, scope and importance of protected cultivation in vegetable production; history and development in India and world.	8
	1.2	Types of protected structures: greenhouse, polyhouse, shade net house, low tunnels and walk-in tunnels; naturally ventilated and climate controlled structures.	
	1.3	Structural components and covering materials: GI pipes, aluminium frames, polyethylene films, shade nets and UV stabilized plastics.	
	1.4	Environmental control: light, temperature, humidity and CO ₂ management; ventilation, cooling systems (pad and fan), fogging and misting systems.	
2.0		Growing Media, Nursery Management and Crop Production	7

	2.1	Soil and soilless culture: types of growing media such as cocopeat, perlite and vermiculite; media sterilization techniques.	
	2.2	Nursery raising under protected structures: pro-tray nursery, seed treatment, germination and seedling management.	
	2.3	Irrigation and fertigation: drip irrigation systems, fertigation scheduling and use of water-soluble fertilizers.	
	2.4	Cultural practices: planting methods, spacing, staking, pruning, training and use of plant growth regulators.	
3.0		Cultivation of Major Vegetables Under Protection	
	3.1	Tomato: varieties suitable for protected cultivation, planting, pruning, training and harvesting.	8
	3.2	Capsicum (Sweet pepper): hybrid selection, planting systems, crop management and harvesting.	
	3.3	Cucumber: parthenocarp varieties, trellising, pruning and harvesting.	
	3.4	Other vegetables: lettuce, leafy vegetables and exotic vegetables suitable for protected cultivation.	
4.0		Plant Protection, Harvesting and Marketing	
	4.1	Major pests and diseases under protected cultivation; integrated pest management practices.	7
	4.2	Physiological disorders in greenhouse vegetables and their management	
	4.3	Harvesting, grading and packaging of vegetables grown under protected structures.	
	4.4	Economics, marketing and export potential of off-season vegetables grown under protected cultivation.	
		Total	30

Text Books and Reference Books:

1. **K. V. Peter**
Basics of Horticulture
2. **G. N. Tiwari**
Greenhouse Technology for Controlled Environment
3. **C. P. Singh**
Protected Cultivation of Horticultural Crops
4. **R. Pradeepkumar**
Protected Cultivation and Secondary Agriculture
5. **S. Prasad & U. Kumar**
Protected Cultivation of Vegetables
6. **Hanan, J.J.**
Greenhouses: Advanced Technology for Protected Horticulture
7. **N. N. Sirohi & T. K. Behera**
Protected Cultivation of Vegetables
8. **Singh, B.**
Advances in Protected Cultivation
9. **Resh, H.M.**
Hydroponic Food Production
10. **Jensen, M.H.**
Controlled Environment Agriculture

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester -VI)
Major Elective Theory Course
Course Code – SHORET 1351

Title of the Course: PROTECTED CULTIVATION OF COMMERCIAL FLOWERS
[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

15. The course is offered for a student registered for undergraduate second year Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year level, for entry level core courses in Horticulture as major subject.
16. The students should have basic knowledge of plant science.

Course objectives:

29. To study and impart knowledge about the occurrence, distribution and morphology of flowering plants.
30. To study the types of classifications- artificial, natural and phylogenetic
31. To study the principles and rules of ICN and taxonomical terminology.
32. To study the various plant families and their economic importance.

Course outcomes:

22. The students understand the morphology, classification, and evolution of flowering plants.
23. The students differentiate between various families of flowering plants and their collection and preservation.
24. The students learn the utilization of flowering plants for human welfare.

Curriculum Details: SHORET 1351-Protected Cultivation of Commercial Flowers

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		<u>Fundamentals of Protected Floriculture</u>	8
	1.1	Introduction: Concept, scope and importance of protected cultivation in floriculture; history and development in India and world.	
	1.2	Types of Protected Structures: Greenhouse, polyhouse, shade net house, low tunnels; naturally ventilated and climate-controlled structures.	
	1.3	Environmental Control: Light, temperature, humidity and CO ₂ regulation; ventilation, cooling systems (pad & fan), fogging and misting.	
	1.4	Economics and Government Support: Cost estimation, financial planning, subsidies, and export potential of cut flowers.	
2.0		<u>Growing Media, Propagation and Crop Management</u>	7
	2.1	Growing Media: Soil and soilless media; cocopeat, perlite, vermiculite; sterilization of media.	
	2.2	Propagation Techniques: Seed propagation, vegetative propagation (cuttings, division), tissue culture plants.	
	2.3	Irrigation and Fertigation: Drip irrigation systems, fertigation scheduling, water-soluble fertilizers.	

	2.4	Cultural Practices: Planting methods, spacing, pinching, pruning, training and use of plant growth regulators.	
3.0		<u>Cultivation of Major Commercial Flowers Under Protection</u>	
	3.1	Rose: Varieties, planting systems, pruning and training, harvesting standards.	8
	3.2	Gerbera: Hybrid selection, bed preparation, planting, nutrient and pest management.	
	3.3	Carnation: Varieties, planting systems, disbudding, staking and harvesting.	
	3.4	Orchids and Liliium: Types, environmental requirements and special cultivation practices.	
4.0		<u>Plant Protection, Post-Harvest and Marketing</u>	
	4.1	Pest and Disease Management: Major pests and diseases; integrated pest management practices.	7
	4.2	Physiological Disorders: Bud drop, stem bending, nutrient deficiencies.	
	4.3	Harvesting and Post-Harvest Handling: Stage of harvest, grading, pulsing, storage and packaging	
	4.4	Marketing and Export: Quality standards, cold chain management, export opportunities	
		Total	30

Text Books and Reference Books:

1. **R. Pradeepkumar**
Floriculture and Landscaping
2. **S. Prasad & U. Kumar**
Protected Cultivation of Horticultural Crops
3. **C. P. Singh**
Protected Cultivation of Horticultural Crops
4. **T.K. Bose & L.P. Yadav**
Commercial Flowers
5. **Hanan, J.J.**
Greenhouses: Advanced Technology for Protected Horticulture
6. **Larson, R.A. (Ed.)**
Introduction to Floriculture
7. **Bhattacharjee, S.K.**
Advanced Commercial Floriculture
8. **Dole, J.M. & Wilkins, H.F.**
Floriculture: Principles and Species
9. **N. N. Sirohi & T. K. Behera**
Protected Cultivation of Vegetables and Flowers

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester -VI)
Major Elective Practical Course
Course Code – SHOREP 1351

Title of the Course: Practical Based on SHORET 1351

[No. of Credits: 2 Credit] [Total:30 Hours]

Course pre-requisite:

13. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
14. The students should have basic knowledge of plant science.

Course objectives:

19. To develop skill and technique among the students to study morphology and classification of plants.
20. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
21. To differentiate between families of flowering plants.

Course outcomes:

19. Students develop skill to study the flowering plants.
20. The students understand the morphology and classification of flowering plants.
21. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHOREP 1351: Practical Based on SHORET 1351

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of different types of protected structures used in floriculture.	4
2.	Identification of greenhouse components and covering materials.	4
3.	Preparation and sterilization of growing media.	4
4.	Nursery raising and propagation techniques for flower crops.	4
5.	Planting methods and spacing in greenhouse flower crops.	4
6.	Training and pruning.	4
7.	Special horticulture practices budding, disbudding and pinching practices	4
8.	Cultural Practices followed in floriculture	4
9.	Physiological disorders in flowers	4
10.	Installation and operation of drip irrigation and fertigation system	4
11.	Identification of major pests and diseases in protected floriculture.	4
12.	Harvesting, grading and packaging of cut flowers.	4

13.	Marketing and Export of flowers	4
14.	Economic analysis of protected flower cultivation	4
15.	Visit to commercial unit	4
	Total	60

Text Books and Reference Books:

1. **R. Pradeepkumar**
Floriculture and Landscaping
2. **T.K. Bose & L.P. Yadav**
Commercial Flowers
3. **C. P. Singh**
Protected Cultivation of Horticultural Crops
4. **S. Prasad & U. Kumar**
Protected Cultivation of Horticultural Crops
5. **K. V. Peter**
Basics of Horticulture
6. **Bhattacharjee, S.K.**
Advanced Commercial Floriculture
7. **Larson, R.A. (Ed.)**
Introduction to Floriculture
8. **Dole, J.M. & Wilkins, H.F.**
Floriculture: Principles and Species
9. **Hanan, J.J.**
Greenhouses: Advanced Technology for Protected Horticulture
10. **G. N. Tiwari**
Greenhouse Technology for Controlled Environment

National Education Policy 2020
B.Sc. Horticulture, III Year (Semester -VI)
VSC Course
Course Code – SHORVC 1351

Title of the Course: APPLICATION OF PLANT GROWTH REGULATORS IN
HORTICULTURAL CROPS

[No. of Credits: 2 Credit] [Total:60 Hours]

Course pre-requisite:

15. The course is offered for a student registered for second year undergraduate Programme in the Faculty of Science and Technology who had primary training in the field of plant sciences at undergraduate first year for entry level core courses in Horticulture as major subject.
16. The students should have basic knowledge of plant science.

Course objectives:

22. To develop skill and technique among the students to study morphology and classification of plants.
23. To study and impart knowledge about the occurrence, distribution, structure and life history Flowering plants.
24. To differentiate between families of flowering plants.

Course outcomes:

22. Students develop skill to study the flowering plants.
23. The students understand the morphology and classification of flowering plants.
24. The students learn the evolution of flowering plants and their utilization for human welfare.

Curriculum details: SHORVC 1351: Application of Plant Growth Regulators in Horticultural Crops

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of different types of plant growth regulators and their classification (Auxins, Gibberellins, Cytokinin's, Ethylene, ABA)	4
2.	Preparation of stock solutions of plant growth regulators (ppm calculation and dilution)	4
3.	Study of methods of application of PGRs (seed treatment, foliar spray, dip method, lanolin paste)	4
4.	Effect of auxins (IAA/IBA/NAA) on root initiation in cuttings	4
5.	Effect of gibberellic acid (GA ₃) on seed germination and seedling growth	4
6.	Effect of cytokinin's on shoot proliferation and delay of senescence	4
7.	Effect of ethylene on fruit ripening and senescence	4
8.	Effect of growth retardants (CCC, MH) on plant height and flowering	4
9.	Study of role of PGRs in breaking seed dormancy	4

10.	Effect of PGRs on flowering induction and fruit set in horticultural crops	4
11.	Study of use of auxins in prevention of fruit drop	4
12.	Effect of PGRs on parthenocarpy (seedless fruit formation)	4
13.	Study of use of PGRs in increasing fruit size and yield	4
14.	Effect of PGRs on post-harvest life and shelf life of horticultural produce	4
15.	Economic analysis of PGR application in horticultural crops	4
	Total	60

Text Books and Reference Books:

1. **V. B. Bhatla & M. A. Lal**
Plant Physiology, Development and Metabolism
2. **Taiz, L., Zeiger, E., Møller, I.M. & Murphy, A.**
Plant Physiology and Development
3. **Pandey, S.N. & Sinha, B.K.**
Plant Physiology
4. **K. V. Peter**
Basics of Horticulture
5. **H.P. Singh**
Plant Growth Regulators in Agriculture and Horticulture
6. **Salisbury, F.B. & Ross, C.W.**
Plant Physiology
7. **Davies, P.J. (Ed.)**
Plant Hormones: Biosynthesis, Signal Transduction, Action!
8. **Arteca, R.N.**
Plant Growth Substances: Principles and Applications
9. **Srivastava, L.M.**
Plant Growth and Development: Hormones and Environment
10. **Ashraf, M. & Harris, P.J.C.**
Plant Growth and Development under Environmental Stress

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