



SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

**SEMESTER PATTERN CURRICULUM UNDER
CHOICE BASED CREDIT SYSTEM (CBCS) FOR**

Under Graduate (UG) Programme
Faculty of Science & Technology

SUBJECT: HORTICULTURE

CLASS: B.Sc. THIRD YEAR

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HORTICULTURE**

With Effect From June, 2018



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INTRODUCTION:

The SRTMUN is gearing up for several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with Vision and Mission; process was already initiated towards introduction of semester system, grading system and credit system. In the recent past, University had already implemented Credit based grading system to campus schools and Choice Based Credit System (CBCS) pattern for PG in all the affiliated colleges from the academic year **2014-2015**. These regulations shall be called as Choice Based Course Credit System & Grading, 2014. In short it will be referred as **SRTMUN CBCS REGULATION**.

Now University is going one step ahead to implement Choice Based Credit System (CBCS) pattern at UG level from the academic year **2016-2017** progressively for B.Sc. first year, second year and third year respectively. Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curriculum at UG and PG levels as per the **SRTMUN CBCS REGULATION**, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, Forest Services and the UGC model curriculum are referred to serve as a base in updating the same.

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in the curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

As a result, the grading system is considered to be better than the conventional marks system and hence it has been followed by our university. So, it is desirable to introduce uniform Choice Based Credit System (CBCS). This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students.

The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses). It provides a **cafeteria** type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. It accelerates the teaching-learning process and enables vertical and horizontal mobility in learning.

Keeping in mind BoS in Botany prepared the curriculum to ensure up-to-date level of understanding of horticultural sciences. Study of horticultural sciences prepares the students for a career working in either an educational institution or an industry in which they can be directly involved in the research and development and Knowledge of modern and applied horticultural science and excellent career prospects.

The study of Horticulture aims to expand and increase current knowledge about the subject in order to solve problems in many fields including agriculture, floriculture, Olericulture, pomology, vegetable and fruit products, storage techniques of the products, medicines, biotechnology and horticulture. These are some of the objectives kept in mind during drafting the syllabi and these are the core objectives.

The addition of Skill enhancement course aims to develop skills in Horticultural sciences and practical experience to the students.

At the end of the curriculum, the student would have increased an aptitude towards science and nature. He would undertake the fundamental and applied research in Horticultural science for the benefit of the human and nature.

At last comments, suggestions are welcome from all the teachers, stakeholders and students for the upbringing the curriculum.



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SALIENT FEATURES:

B.Sc. third year Horticulture syllabus has been framed to meet the requirement of Choice based Credit System. The courses offered herein will train and orient the students in the field of Horticulture.

The **Section-A of DSEH** deals with production technology of spices, condiments, medicinal and aromatic plants. The **Section-B of DSEH** provides choice of an option to learn course dealing with post harvesting, handling, processing and preservation technology. This would help students to lay a strong foundation in the field of Horticulture.

Overall after completion of this course, students would be acquire fundamental knowledge in Horticultural Science and also understand that Horticulture is an integral part of the human life and developments.

Skill Enhancement Courses offered during this program are designed with the aim of imparting specific skills to the students which will lead to the self employability through development of their own enterprises.

UTILITY OF COURSE:

This program will train and orient the students in the field of production technology of spices, condiments, medicinal and aromatic plants, post harvesting, handling, processing and preservation and marketing technology in relation to Environment and Agriculture as well as Biotechnological, Pharmaceutical and Herbal Industries. This will help the students for their career development.

Skill Enhancement Courses offered during this program will provide additional specific skills to the students for self employability through the development of their own enterprises.

LEARNING OBJECTIVES:

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.
2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.
3. To impart knowledge of horticultural science as the basic objective of Education
4. To develop a scientific attitude to make students open minded, critical and curious
5. To develop an ability to work on their own and to make them fit for the society
6. To expose themselves to the diversity amongst life forms
7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of horticultural plant materials and data
8. To make aware of natural resources and environment and the importance of conserving the same
9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient
10. To appreciate and apply ethical principles to horticultural science research and studies

PREREQUISITE:

The optional courses are offered to the students registered for undergraduate programs. Such students should have the basic knowledge of Horticultural Science and willing to gain additional knowledge in the field of Horticulture.



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An Outline:

Semester/ Annual	Course No.	Course Name	Periods/ Week/ Divi/ Batch	Total Periods	Marks for		Credits (Marks)	
					Internal (CA)	External (ESE)		
Semester-V	DSEH-I	Section-A: Production Technology of Spices and Condiment Crops (P-XII)	03	45	10	40	Credits: 02 (Marks:50)	
		Section-B: Post Harvest and Handling of Horticultural Crops (P-XIII)	03	45	10	40	Credits: 02 (Marks:50)	
Semester-VI	DSEH-II	Section-A: Production Technology of Medicinal and Aromatic Plants (P-XIV)	03	45	10	40	Credits: 02 (Marks:50)	
		Section-B: Processing and Preservation Technology (P-XV)	03	45	10	40	Credits: 02 (Marks:50)	
Annual Pattern	DSEHP-I	Practicals based on Section-A of DSEH-I&II (P-XVI)	03	45	10	40	Credits: 02 (Marks:50)	
	SECH-III	SECH-III A OR SECH-III B	03	45	25	25	Credits: 02 (Marks:50)	
Annual Pattern	DSEHP-II	Practicals based on Section-B of DSEH-I&II (P-XVII)	03	45	10	40	Credits: 02 (Marks:50)	
	SECH-IV	SECH-IV A OR SECH-IV B	03	45	25	25	Credits: 02 (Marks:50)	
Total Credits Semester-V and VI						Marks: 60+50= 110	Marks: 240+50= 290	Credits: 12+04=16 (Marks: 300+100 =400)

DSEH: Discipline Specific Elective Horticulture, **DSEHP:** Discipline Specific Elective Horticulture Practical, **ESE:** End semester examination, **CA:** Continuous Assessment, **SECH:** Skill Enhancement Course Horticulture

Distribution of credits: 80% of the total credits for ESE and 20% for CA

- **CA of Marks-10 (Theory):** 05 marks for Test and 05 marks for Assignment
- **CA of Marks-10 (Practical):** 05 marks for Test and 05 marks for Record book, excursion report and collection if any
- **CA of Marks 25:** 15 for marks Seminar and 10 marks for Test

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SEMESTER-V

DSEH-I

SECTION-A: PRODUCTION TECHNOLOGY OF SPICES AND CONDIMENT CROPS (P-XII)

Periods: 45

Credits: 02 (Maximum Marks: 50)

Unit-I: Spices and Condiments-I (12 periods)

Introduction; Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Turmeric, Coriander and Cardamom

Unit-II: Spices and Condiments-II (10 periods)

Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Ginger, Fenugreek, Clove and Cumin

Unit-III: Spices and Condiments-III (13 periods)

Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Chilli, Mustard, Curry leaf and Black pepper

Unit-IV: Spices and Condiments-IV (10 periods)

Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Garlic, onion, Saffron and Nutmeg

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SEMESTER-V

DSEH-I

SECTION-B: POST HARVEST AND HANDLING OF HORTICULTURAL CROPS (P-XIII)

Periods: 45

Credits: 02 (Maximum Marks: 50)

Unit-I: Post Harvest and Handling of Horticultural Crops (12 periods)

Importance of Post Harvest Handling; Maturity and maturity indices of Horticultural crops; harvesting methods of Horticultural crops

Unit-II: Harvesting Factors of Horticultural Crops (13 periods)

Factors responsible for Maturity, Ripening and Deterioration of Horticultural crops; **Pre harvest factors**- Selection of varieties, Cultural operations, Pre harvest treatments, Maturity and Harvesting; **Post harvest factors**-Curing, De greening, Pre cooling, Washing and drying, Storing and grading, Disinfestations, Post harvest treatments and Waxing

Unit- III: Ripening of Horticultural Crops (10 periods)

Methods used for hastening and delaying ripening; Chemical that hastens ripening; Chemicals that delay in ripening; Respiration and Transpiration in relation to Harvesting, Packing, Transportation and Storage

Unit-IV: Bio deterioration of Horticultural Crops (10 periods)

Nature and causes of deterioration; Primary causes of losses- Mechanical losses, Physio –biochemical losses, Microbial losses and Physical losses; Secondary causes of losses- Methods of pre Cooling, Grading, Packaging, Storage and Transport of Horticultural crops

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SEMESTER-VI

DSEH-II

SECTION-A: PRODUCTION TECHNOLOGY OF MEDICINAL AND AROMATIC PLANTS (P-XIV)

Periods: 45

Credits: 02 (Maximum Marks: 50)

Unit-I: Medicinal and Aromatic Plants-I (13 periods)

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Dioscoria, Rauwolfia and Opium

Unit-II: Medicinal and Aromatic Plants-II (12 periods)

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Periwinkle, Aloe, Guggul and Plantago

Unit-III: Medicinal and Aromatic Plants-II (10 periods)

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Coleus, Stevia, Senna and Solanum

Unit-IV: Medicinal and Aromatic Plants-IV (10 periods)

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Sandalwood, Mehendi, Mint and Lemon grass

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SEMESTER-VI

DSEH-II

SECTION-B: PROCESSING AND PRESERVATION TECHNOLOGY (P-XV)

Periods: 45

Credits: 02 (Maximum Marks: 50)

Unit-I: General account (12 periods)

History of Food Preservation; Importance and Scope of Fruit and Vegetable Preservation; Selection of Site for Fruits and Vegetables Preservation Unit; Principles and Methods of Preservation

Unit-II: Dehydration and Canning (10 periods)

Dehydration of Fruits and Vegetables; Canning of vegetables; Food preservatives; Colours and flavours used in food Industry

Unit-III: Preparation of fruit products (13 periods)

Preparation of Mango pulp, Papaya jam, Grape juice, Apple jelly, Citrus squash & marmalade

Unit-IV: Preparation of vegetable products (10 periods)

Tomato juice, Tomato sauce, Garlic and Ginger paste, Chilli pickle and Mixed Vegetable Pickle

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DSEH-I & II

END OF SEMESTER EXAMINATION (ESE)

Skeleton question paper

Time: Two hours

Maximum Marks: 40

- Note:** (i) Attempt all questions
(ii) All questions carry equal marks
(iii) Draw neat and well labelled diagrams wherever necessary

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- Q1. Attempt any four of the following (Based on Unit-I, II, III & IV: Minimum one and maximum two questions from each unit) 08 Marks
- 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
- Q2. Attempt any two of the following (Based on Unit-I & II) 08 Marks
- 1.
 - 2.
 - 3.
- Q3. Attempt any one of the following (Based on Unit-I & II) 08 Marks
- 1.
 - 2.
- Q4. Attempt any two of the following (Based on Unit-III & IV) 08 Marks
- 1.
 - 2.
 - 3.
- Q5. Attempt any one of the following (Based on Unit-III & IV) 08 Marks
- 1.
 - 2.



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DSEHP-I: Practicals Based On Section-A of DSEH-I&II (P-XVI)

Practical: 16

Credits: 02 (Maximum Marks: 50)

Practical Exercises: Based on section-A of DSEH-I:

Practical no. 1-4: Study of Spices and Condiments

Practical no. 5-6: After care in Spices and Condiments

Practical no. 7-8: Harvesting and curing of spices and condiments

Practical Exercises Based on section-A of DSEH-II:

Practical no. 9-10: Study of Medicinal plants

Practical no. 11: Study of Aromatic plants

Practical no. 12-14: Extraction of Essential Oils from Aromatic plants

Practical no. 15-16: Micro Chemical tests of ingredients from Medicinal plants

(Several local and at least one long Horticultural excursions. The excursion report shall carry marks)

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DSEHP-I: Practicals Based On Section-A of DSEH-I&II (P-XVI)

End of Semester Examination (ESE)

Skeleton question paper

Time: Three hours

Maximum Marks: 40

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- Note: -**
- (i) *Attempt all questions*
 - (ii) *Show your preparation to the examiner*
 - (iii) *Draw neat and well labelled diagrams wherever necessary*
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- Q1.** Identify and describe the given spice and condiment crop samples of Specimen- A and B **10 Marks**
- Q.2.** Identify and describe the given Medicinal and Aromatic plant samples of the Specimen- C and D **10 Marks**
- Q.3.** Detect the essential oil /micro-chemical tests of the given Specimen-E **10 Marks**
- Q.4.** Spotting: Three spots (Spot-F, Spot-G, Spot-H) **06Marks**
- Q.5.** Viva-Voce **04Marks**



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DSEHP-II: Practicals Based On Section-B of DSEH-I&II (P-XVII)

Practical: 16

Credits: 02 (Maximum Marks: 50)

PRACTICAL EXERCISES: BASED ON SECTION-B OF DSEH-I:

Practical no. 1-2: Maturity and Harvesting Indices of Important Fruit and vegetable Crops

Practical no.3: Temperature and Relative Humidity for Storage of Fruits

Practical no.4: Temperature and Relative Humidity for Storage of Vegetables

Practical no. 5: Changes in Total Soluble Solids of Fruits during Storage

Practical no.6: Changes in Acidity of Fruits during Storage

Practical no.7: Changes in Total Sugars of Fruits during Storage

Practical no.8: Changes in Reducing and Non Reducing Sugars of Fruits during Storage

PRACTICAL EXERCISES: BASED ON SECTION-B OF DSEH-II:

Practical no. 9: Preparation of Mango pulp

Practical no. 10: Preparation of Papaya jam

Practical no. 11: Preparation of Apple & Wood Apple jelly

Practical no. 12: Preparation of Citrus Squash

Practical no. 13: Preparation of Citrus Marmalade

Practical no. 14: Preparation of Tomato sauce

Practical no. 15: Preparation of Chilli pickle

Practical no. 16: Preparation of Mixed Vegetable pickle

(Several local and at least one long Horticultural excursions. The excursion report shall carry marks)



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DSEHP-II: Practicals Based On Section-B of DSEH-I&II (P-XVII)

End of Semester Examination (ESE)

Skeleton question paper

Time: Three hours

Maximum Marks: 40

-
- Note: -**
- (i) *Attempt all questions*
 - (ii) *Show your preparation to the examiner*
 - (iii) *Draw neat and well labelled diagrams wherever necessary*
-

- | | | |
|-------------|---|----------------|
| Q1. | Estimate the Total Soluble Solids (TSS)/Acidity/Reducing Sugars/Total Sugars of given fruit sample of the Specimen- A | 10Marks |
| Q.2. | Prepare the given fruit product of the given sample of Specimen-B | 10Marks |
| Q.3. | Prepare the given vegetable product of the given sample of Specimen-C | 10Marks |
| Q.4. | Spotting: Three spots (Spot-F, Spot-G, Spot-H) | 06Marks |
| Q.5. | Viva-Voce | 04Marks |



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SKILL ENHANCEMENT COURSE HORTICULTURE

SECH-III

Periods: 45

Credits: 02 (Maximum Marks: 50)

SECH-III A: MEDICINAL PLANTS

UNIT-I: MEDICINAL PLANTS (6 Theory periods)

Introduction, Definitions, Scope and Importance, Concept of active principles

UNIT-II: STUDY OF MEDICINAL PLANTS (15 Theory periods)

Description, Identification and Classification, medicinal uses of locally available medicinal plants (Awla, Adulsa, Ginger)

UNIT-III: PRACTICALS ON MEDICINAL PLANT PRODUCT PREPARATION (8 practicals)

Preparation of Awla candy, Awla masticator (Awla supari), Adulsa syrup, Ginger syrup and cake, Visit to a production industry in nearby area (Students are expected to prepare a model of production industry, a visit report and to submit the same at the time of practical examination.

OR

SECH-III B: BIOCONTROL

UNIT-I: BIOCONTROL (6 Theory periods)

Introduction, Definition, Biocontrol agents, Need of biocontrol, Concept of biocontrol (ways, limitations and factors affecting success of biocontrol, Environmental health hazards due to pesticides and fungicides), Plant based products (Azadirachtin, Neem cake, Indiar, Pyrethrines, Phermones, Trichoderma etc.)

UNIT-II: TRICHODERMA CULTIVATION (15 Theory periods)

Introduction, Systematic position, thallus structure, Trichoderma as biocontrol agent, Mode of action, Uses, Trichoderma as a commercial biocontrol agent, Cultivation details of Trichoderma

UNIT-III: PRACTICALS ON TRICHODERMA CULTIVATION (8 practicals)

Principle, Requirement, procedure, observations, Harvesting, results and records precautions, Visit to a Trichoderma cultivation laboratory in nearby area (Students are expected to prepare a model of Trichoderma cultivation laboratory, a visit report and to submit the same at the time of practical examination.

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SECH-IV

Periods: 45

Credits: 02 (Maximum Marks: 50)

SECH-IVA: VERMICOMPOST

UNIT-I: VERMICOMPOST(21 Theory periods)

Introduction, Definition, Study of earth worm species, adequate food, moisture, temperature and light, Building of vermicompost beads, nutrient value of vermicompost, vermicompost requirement of crops,

UNIT-II: practicals on Vermicompost preparation (08 periods)

Principle, Requirement, procedure, observations, Visit to a Vermicompost unit in nearby area (Students are expected to prepare a model of vermicompost pit, a visit report and to submit the same at the time of practical examination.

OR

SECH-IVB: IRRIGATION SYSTEMS

UNIT-I: IRRIGATION SYSTEMS (21 Theory periods)

Introduction, Importance, soil, climate, water, requirement of horticultural crops, critical stages of plants, uptake of moisture, Roll in photosynthesis, translocation of nutrients, evaporation losses

UNIT-III: PRACTICALS ON LAYOUT OF IRRIGATION SYSTEMS (8 practicals)

Layout of Ring irrigation system, Chanel irrigation system, subsurface irrigation system, Drip irrigation system, Sprinkler Irrigation system. Visit to orchards in nearby area. Students are expected to prepare a paper sketch layout plan of irrigation systems, a visit report and to submit the same at the time of practical examination.



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SKILL ENHANCEMENT COURSE HORTICULTURE

SECH-III&IV

END OF SEMESTER EXAMINATION (ESE)

Maximum Marks: 25

SEAT NO:

MARK SHEET

Sr. No.	END OF SEMESTER EXAMINATION (ESE)	Maximum Marks	Obtained Marks
1	Skill Work report submission	10	
2	Over all skill judgement	10	
3	Skill Work presentation	05	
4	Total Marks	25	

Name & Signature of:

Examiner- 1:

Examiner- 2:

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