

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.

**B.Sc. GENERAL (SEMESTER PATTERN)
B.Sc. Third YEAR
HORTICULTURE - CURRICULUM**

With Effect from June - 2011

INTRODUCTION

Revising and updating of the curricula is the continuous process to provide an updated education to the students at large. Up till now there was wide diversity in the curricula of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curricula at UG and PG levels in different Indian Universities, the UGC developed a model curriculum and forwarded the same to all the universities in the country to serve as a base in updating their respective curricula.

For developing the final draft of curriculum, the BOS in Horticulture took into account total number of teaching days available in a year and the guidelines given by the faculty of science of the S.R.T.M.U Nanded. The BOS in Horticulture held a couple of meetings in which there were thorough and critical discussions.

S.R.T.M.U. Nanded is having B.Sc. (General) Horticulture course. The course content has been designed on semester pattern.

The course content of each theory paper is divided into units and subunits by giving appropriate titles and subtitles. For each unit, total number of periods required and weightage of maximum marks is mentioned. At the end of each theory paper the list of selected reading material is provided. A list of practical exercises to be completed in the academic year is also given. Paper wise skeleton question paper is provided as a guideline to teachers, students and paper setters.

Board of Studies

1. Chairman - Dr. Bodke S. S.

Head Department of Botany and Horticulture,
Yeshwant Mahavidyalaya, Nanded.

2. Member - Mrs. Gore A. K.

Assistant Professor,
Department of Botany and Horticulture,
Yeshwant Mahavidyalaya, Nanded.

3. Member - Mr. Patil S. A.

Assistant Professor,
Department of Botany and Horticulture,
Yeshwant Mahavidyalaya, Nanded.

OBJECTIVES

1. To evolve uniform curricula in all the universities of the country and to provide mobility to students from one university or state to other
2. To update curricula by introducing recent advances in the subject and enable the students to face NET, SET UPSC and other competitive examinations successfully.
3. To create awareness among the students about the Horticulture and train them in the subject.
4. To improve the quality of laboratory and field work, for which study tours and excursions have been made compulsory so that the students can become familiar with the horticultural aspects of that area.
5. To prepare such a dynamic curricula by incorporating innovative concepts and a multidisciplinary approach which can attract and develop interest among the students for selecting plant science as their career.

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. GENERAL (SEMESTER PATTERN)
HORTICULTURE –CURRICULUM**

B.Sc.I Year Horticulture Curriculum (w.e.f.June, 2009):

Class	Paper No.	Title of Paper	Periods/ Practicals	Time duration of Examination	Maximum Marks
B.Sc.I Semester-I	I (Th.)	Fundamentals of Horticulture	45	3 Hrs.	50+10
	II (Th.)	Propagation and Nursery Management	45	3 Hrs.	50+10
B.Sc.I Semester-II	III (Th.)	Production Technology of Tropical and Sub-tropical Fruit Crops	45	3 Hrs.	50+10
	IV (Th.)	Production Technology of Arid, Minor and Plantation Fruit Crops	45	3 Hrs.	50+10
B.Sc.I	V (Practical) Annual pattern	Practical based on theory papers of Semester-I&II	20+4	4 Hrs.	60
B.Sc.II Semester-III	VI (Th.)	Production Technology of Vegetable Crops I	45	3 Hrs.	50+10
	VII (Th.)	Production Technology of Vegetable Crops II	45	3 Hrs.	50+10
B.Sc.II Semester-IV	VIII (Th.)	Ornamental and Landscape Gardening	45	3 Hrs.	50+10
	IX (Th.)	Commercial Floriculture	45	3 Hrs.	50+10

B.Sc.II	X (Practical) Annual pattern	Practical based on theory papers VI & VII of Semester-III	20+4	4 Hrs.	50
	XI (Practical) Annual pattern	Practical based on theory papers VIII & IX of Semester-IV	20+4	4 Hrs.	50
B.Sc.III Semester-V	XII (Th.)	Production Technology of Spices and Condiment s Crops	45	3 Hrs.	50
	XIII (Th.)	Production Technology of Medicinal and Aromatic Plants	45	3 Hrs.	50
B.Sc.III Semester- VI	XIV (Th.)	Post Harvest Handling of Horticultural Crops	45	3 Hrs.	50
	XV(Th.)	Processing of Horticultural Crops	45	3 Hrs.	50
B.Sc.III	XVI (Practical) Annual pattern	Practical based on theory papers XII & XIII of Semester-V	20+4	4 Hrs.	50
	XVII (Practical) Annual pattern	Practical based on theory papers XIV & XV of Semester-VI	20+4	4 Hrs.	50

Total B.Sc. First Year Horticulture:

Two theory papers of Sem-I - 100 Marks
 Two theory papers of Sem-II - 100 Marks
 One practical paper of annual pattern - 100 Marks,

Total - 300 Marks

Workload:

Theory: Per paper per week three periods

Practical: Per batch per week one practical (Three periods)

Total B.Sc. Second Year Horticulture:

Two theory papers of Sem-III	- 100 Marks
Two theory papers of Sem-IV	- 100 Marks
Two practical papers of annual pattern	- 100 Marks,

Total - 300 Marks

Workload:

Theory: Per paper per week three periods

Practical: Per batch per week one practical (Three periods)

Total B.Sc. Third Year Horticulture:

Two theory papers of Sem-V	- 100 Marks
Two theory papers of Sem-VI	- 100 Marks
Two practical papers of annual pattern	- 100 Marks,

Total - 300 Marks

Workload:

Theory: Per paper per week three periods

Practical: Per batch per week one practical (Three periods)

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. Third Year
Semester - V
HORTICULTURE
Theory Paper-XII**

(Production Technology of Spices and Condiments Crops)

Periods: 45

Marks: 50

Unit I (12 periods)

*Introduction to spices and condiments

Geographical distribution of spices and condiments, area, 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 following crops.

1. Turmeric
2. Coriander
3. Cardamom

Unit II (11 periods)

Geographical distribution of spices and condiments, area, 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 following crops.

1. Ginger
2. Fenugreek
3. Clove
4. Cumin

Unit III (11 periods)

Geographical distribution of spices and condiments, area, 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 following crops.

1. Chilli
2. Mustard
3. Curry leaf
4. Black pepper

Unit IV (11 periods)

Geographical distribution of spices and condiments, area, 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 following crops.

1. Garlic
2. All spice
3. Saffron
4. Nutmeg

Selected Readings

Sr. No.	Author/s	Title	Publication
1.	K. G. Shanmugavelu, V. N. Madhavrao,	Spices and Condiments crops	Nadra Popular Depot, Sterlin road, Nungambakkam
2.	K.M. Pillai	Textbook of Plantation Crops	Vini Education Books Pub. House, Ansari Road, New Delhi.
3.	J. S. Pruthi	Spices and Condiments	National Books Trust, New Delhi
4.	V. B. Singh and Kirti Singh	Spices	New Age International (P) Limited Publishers
6.	K. L. Chadha	Handbook of Horticulture	ICAR
7.	S. B. Gurav	Aromatic, Spice and Medicinal Plants	Snehvardhan Publishing House, Pune

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

SKELETON OF QUESTION PAPER

**B.Sc. Third Year
Semester - V
HORTICULTURE
Theory Paper-XII**

(Production Technology of Spices and Condiments Crops)

Time: 2.10 hours

Maximum Marks: 25

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

- | | |
|--|------------------------|
| Q1. Compulsory questions on basic concepts:
(Five questions of one mark each from all units) | 05 |
| Q2. Short answer type question from all units:
(Any two of the four questions) | 10 |
| Q3. Long answer type question:
OR
Long answer type question: | 10
10 |

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. Third Year
Semester - V
HORTICULTURE
Theory Paper-XIII**

(Production Technology of Medicinal and Aromatic Plants)

Periods: 45

Marks: 50

Unit I (12 periods)

*Introduction to medicinal and aromatic plants

History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of following medicinal plants.

1. Dioscoria
2. Rauwolfia
3. Opium

Unit II (11 periods)

History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of following medicinal plants.

1. Periwinkle
2. Aloe
3. Guggul
4. Plantago

Unit III (11 periods)

History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of following medicinal plants.

1. Coleus
2. Stevia
3. Senna
4. Solanum

Unit IV (11 periods)

History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of following aromatic plants.

1. Sandalwood
2. Mehendi
3. Mint
4. Lemon grass

Selected Readings

Sr. No.	Author/s	Title	Publications
1.	Atal E. K., and Kaput, B. M.	Cultivation and Industries of Medicinal and Aromatic Plants (1989) Vol. I and II	CRRL, CSIR, Jammu and Kashmir
2.	K. L. Chadha and Rajendra gupta	Advances in Horticulture (1995) Vol. II	
3.	Kirtikar <i>et al.</i>	Indian Medicinal Plants (1975) Vol I & IV	
4.	S. K. Jain	Medicinal Plants	
5.	Kumar, N.	Introduction to Spices, Plantation crops. Medicinal and Aromatic Plants	Scientific Book Suppliers, 2726, Mrinagar, Delhi 110 035
6.	K. L. Chadha	Handbook of Horticulture	ICAR
7.	S. B. Gurav	Aromatic, Spice and Medicinal Plants	Snehvardhan Publishing House, Pune

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

SKELETON OF QUESTION PAPER

B.Sc. Third Year

Semester - V

HORTICULTURE

Theory Paper-XIII

(Production Technology of Medicinal and Aromatic Plants)

Time: 2.10 hours

Maximum Marks: 25

Note: (i) Attempt all questions
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- | | |
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| Q1. Compulsory questions on basic concepts: | 05 |
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| OR | |
| Long answer type question: | 10 |

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. Third Year
Semester - VI
HORTICULTURE
Theory Paper-XIV**

(Post Harvest Handling of Horticultural Crops)

Periods: 45

Marks: 50

Unit I (12 periods)

1. Importance of Post Harvest Handling
2. Maturity and maturity indices of Horticultural crops
3. Harvesting methods of Horticultural crops

Unit II (11 periods)

1. Factors responsible for Maturity, Ripening and Deterioration of Horticultural crops
 - a. Pre harvest factors
 - i) Selection of varieties
 - ii) Cultural operations
 - iii) Pre harvest treatments
 - iv) Maturity
 - v) Harvesting
 - b. Post harvest factors
 - i) Curing
 - ii) Degreening
 - iii) Pre cooling
 - iv) Washing and drying
 - v) Storing and grading
 - vi) Disinfestation
 - vii) Post harvest treatments
 - viii) Waxing

Unit III (11 periods)

1. Methods used for hastening and delaying ripening
 - a. Chemical that hasten ripening
 - b. Chemicals that delay in ripening
2. Respiration and Transpiration in relation to Harvesting, Packing, Transportation and Storage

Unit IV (11 periods)

1. Nature and causes of deterioration
 - a. Primary causes of losses
 - i) Mechanical losses
 - ii) Physio –biochemical losses
 - iii) Microbial losses
 - iv) Physical losses
 - b. Secondary causes of losses
2. Methods of pre Cooling, Grading, Packaging, Storage and Transport of Horticultural crops

Selected Readings

Sr. No.	Author/s	Title	Publications
1.	Pantastico E.R.B (1975)	Post harvest Physiology, Handling, Industries of Tropical and Sub-tropical Fruits and Vegetables	The AVI Publishing Co. Inc. Westport, Connecticut
2.	Salunkhe D. K. & B. B. Desai (1984)	Post Harvest Biotechnology of Vegetables Vol. I & II	CRO Press, Inc. Boca Raton, Florida.
3.	Weichann, J. (1987)	Post harvest Physiology of Vegetables	Mercel Dekker, Inc. New York
4.	Wills, R. B.H	Postharvest An Introduction to Physiology and Handling of Fruits and Vegetables	International Book and Periodicals supply Service Delhi 110 034
5.	Srivastava and Kumar	Preservation of Fruits and Vegetables	
6.	K. L. Chadha	Handbook of Horticulture	ICAR

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SKELETON OF QUESTION PAPER

**B.Sc. Third Year
Semester - VI
HORTICULTURE
Theory Paper-XIV**

(Post Harvest Handling of Horticultural Crops)

Time: 2.10 hours

Maximum Marks: 25

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

- | | |
|---|-----------|
| Q1. Compulsory questions on basic concepts: | 05 |
| (Five questions of one mark each from all units) | |
| Q2. Short answer type question from all units: | 10 |
| (Any two of the four questions) | |
| Q3. Long answer type question: | 10 |
| OR | |
| Long answer type question: | 10 |

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. Third Year
Semester - VI
HORTICULTURE
Theory Paper-XV
(Processing of Horticultural Crops)**

Periods: 45

Marks: 50

Unit I (12 periods)

1. History of Food Preservation
2. Importance and Scope of Fruit and Vegetable Preservation
3. Selection of Site for Fruits and Vegetables Preservation Unit
4. Principles and Methods of Preservation

Unit II (11 periods)

1. Dehydration of Fruits and Vegetables
2. Canning of Vegetables
3. Food Preservatives
4. Colours and Flavours used in Food Industry

Unit III Preparation of fruit products (11 periods)

1. Mango pulp
2. Papaya jam
3. Grape juice
4. Apple jelly
5. Citrus squash & marmalade

Unit IV Preparation of vegetable products (11 periods)

1. Tomato juice
2. Tomato sauce
3. Garlic and Ginger paste
4. Chilli pickle
5. Mixed Vegetable Pickle

Selected Readings

Sr. No.	Author/s	Title	Publications
1.	Giridharilal, G.S., Sidhappa and G.L. Tondan (1986)	Fruit and Vegetable Preservation	ICAR
2.	Shrivastava R.P. (1982)	Preservation of Fruit and Vegetable Products	Bishan Singh and Mahendra Singh Dehradun
3.	Cruess, W.V. (1958)	Commercial Fruit and Vegetable Products	Mac. Graw Hill. Book Co. New York
4.	Morris, J.N. (1951)	Principles of Fruit Preservation	Chpman and hall co., London
5.	Jones Osman (1949)	Canning Practices and Control	Chpman and hall co., London
6.	FAO	Fruit and Vegetable Processing	International Book Distributing Co. Chamma studio building, 2 nd floor, Charbagh, Lucknow 226 004
7.	Manoranjandas Kalia and Sangeeta Sood	Preservation of Fruit and Vegetables	
8.	K. L. Chadha	Handbook of Horticulture	ICAR

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

SKELETON OF QUESTION PAPER

**B.Sc. Third Year
Semester - VI
HORTICULTURE
Theory Paper-XV
(Processing of Horticultural Crops)**

Time: 2.10 hours

Maximum Marks: 25

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

- | | |
|--|------------------------|
| Q1. Compulsory questions on basic concepts:
(Five questions of one mark each from all units) | 05 |
| Q2. Short answer type question from all units:
(Any two of the four questions) | 10 |
| Q3. Long answer type question:
OR
Long answer type question: | 10
10 |

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. Third Year
Annual Pattern
HORTICULTURE
Practical Paper-XVI**

(Based on Theory Papers XII & XIII of Semester V)

Periods:- 24 (20+04)

Maximum Marks 50

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

Practical no. 5-7: Study of Medicinal plants

Practical no. 8-9: Study of Aromatic plants

Practical no. 10-12: After care in Spices and Condiments

Practical no. 13-15: Harvesting and Curing of spices and condiments

Practical no. 16-18: Extraction of Essential Oils from Aromatic plants

Practical no. 19-20: Micro Chemical tests of ingredients from Medicinal plants

Practical no. 21-22: Two local Horticultural excursions. The excursion report is necessary for practical examination for evaluation, the report shall carry marks.

Practical no. 23-24: One long Horticultural excursion. The excursion report is necessary for Practical Examination for Evaluation, the report shall carry marks.

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

SKELETON OF QUESTION PAPER

**B.Sc. Third Year
Annual Pattern
HORTICULTURE
Practical Paper-XVI**

(Based on Theory Papers XII & XIII of Semester V)

Date:	Batch No.:
Time: Four hours	Maximum Marks: 50

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

Q1. Identify and describe the given spices and condiments crops 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. Submission **20 marks**

- i) Record book **05 marks**
- ii) Excursion book **05 marks**
- iii) Assignments **05 marks**
- iv) Viva-voce **05 marks**

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. Third Year
Annual Pattern
HORTICULTURE
Practical Paper-XVII**

(Based on Theory Papers XIV & XV of Semester VI)

Periods:- 24 (20+04)

Maximum Marks 50

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

Practical no. 3 & 4: Maturity and Harvesting Indices of Important Vegetable crops

Practical no.5: Temperature and Relative Humidity for Storage of Fruits

Practical no.6: Temperature and Relative Humidity for Storage of Vegetables

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

Practical no.8: Changes in Acidity of Fruits during Storage

Practical no.9: Changes in Total Sugars of Fruits during Storage

Practical no.10: Changes in Reducing and Non Reducing Sugars of Fruits during Storage

Practical no. 11: Preparation of Mango pulp

Practical no. 12: Preparation of Papaya jam

Practical no. 13: Preparation of Grape juice

Practical no. 14: Preparation of Apple & Wood Apple jelly

Practical no. 15: Preparation of Citrus Squash

Practical no. 16: Preparation of Citrus Marmalade

Practical no. 17: Preparation of Tomato juice

Practical no. 18: Preparation of Tomato sauce

Practical no. 19: Preparation of Garlic and Ginger paste

Practical no. 20: Preparation of Chilli pickle

Practical no. 21: Preparation of Mixed Vegetable pickle

Practical no. 22-24: Several local and at least a long Horticultural excursion for fruit and vegetable processing units. The excursion report is necessary for practical examination for evaluation, the report shall carry marks.

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

SKELETON OF QUESTION PAPER

**B.Sc. Third Year
Annual Pattern
HORTICULTURE
Practical Paper-XVII**

(Based on Theory Papers XIV & XV of Semester VI)

Date:	Batch No.:
Time: Four hours	Maximum Marks: 50

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

Q1. Estimate the Total Soluble Solids (TSS)/Acidity/Reducing Sugars/Total Sugars of given fruit sample of the specimen **A** **10 marks**

Q.2. Prepare the given fruit product of the given sample of specimen **B** **10 marks**

Q.3. Prepare the given vegetable product of the given sample of specimen **C** **10 marks**

Q.4. Submission **20 marks**

i) Record book **05 marks**

ii) Excursion book **05 marks**

iii) Assignments **05 marks**

iv) Viva-voce **05 marks**