

**SHIVAJI UNIVERSITY, KOLHAPUR - 416 004,
MAHARASHTRA**
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शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४, महाराष्ट्र
दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दूरध्वनी ०२३१-२६०९०९३/९४



SU/BOS/IDS / 052

Date: 29/10/2022

To,
The Principals,
All Concerned Affiliated Colleges / Institutions.
Shivaji University, Kolhapur.

Subject: Regarding syllabi of Horticulture Science and Technology, Part - III
under the Faculty of Inter-Disciplinary Studies.

Sir/Madam,

With reference to the subject, mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi of Horticulture Science and Technology, Part - III under the Faculty of Inter-Disciplinary Studies.

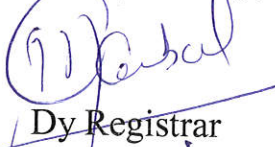
This syllabi and equivalence shall be implemented from the academic year 2022-2023 onwards. A soft copy containing the syllabi is attached herewith and it is also available on university website www.unishivaji.ac.in. (Students / Online Syllabus)

The question papers on the pre-revised syllabi of above mentioned course will be set for the examinations to be held in October / November 2022 & March / April 2023. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,


Dy Registrar

Copy to:

1	Director Board of Evaluation and Examination	9	Centre for Distance Education
2	The Dean, Faculty of IDS	10	Computer Centre
3	The Chairman, Respective Board of Studies	11	Affiliation Section (U.G.)
4	B.A., B.Com., B.Sc. Exam	12	Affiliation Section (P.G.)
5	Eligibility Section	13	P.G. Admission Section
6	O.E. I, II, III, IV Section	14	Appointment Section

SHIVAJI UNIVERSITY, KOLHAPUR



A⁺⁺ Accredited by NAAC
(2021) with CGPA 3.52

Faculty of Interdisciplinary Studies

Structure, Scheme and Syllabus for

Bachelor of Vocational (B. Voc.)

Horticulture Science And Technology

Part III- Sem. V & VI

(Subject to the modifications that will be made from time to time)

Choice Based Credit System (CBCS) w.e.f. 2022-2023.

1. COURSE INFORMATION

Ministry of HRD, Government of India has introduced Entrepreneurship oriented Skill development courses of B.Voc./M.voc. courses. These courses will be run by NSQF approved institutes by using available infrastructure and facilities. In these courses the institute will conduct general education content and sector specific skills will be imparted by Skill Knowledge Providers/ Training Providers/ Industries.

During the three year duration of 'Horticulture Science And technology' a candidate is trained on professional skill, professional knowledge and Employability skill related to job role. In addition to this a candidate is entrusted to undertake project work, extracurricular activities and on job training to build up confidence. The broad components covered under Professional Skill subject are as below:-

During the three year duration the trainee learns about agro-meteorology, importance of different elements of weather & climate of agriculture, farm power and machinery, types and application of farm power, farm electricity, agricultural implements, basic knowledge on plant biology, Renewable energy, Soil properties, concept of formation of soil moisture and its conservation, role of organic matter in soil and its recycling water and their management, Soil fertility, fertilizers, manures & management of soil fertility and productivity, Introductory horticulture, fundamentals of horticultures, Importance and scope of horticulture, classification of horticultural plants etc. plant tissue culture techniques . The trainee learns about importance of fruits, flowers and vegetables, distribution of area production and productivity of fruits, vegetables and flowers, present situation and scope of development of horticultural crops, schemes on horticultural development, layout of plots and gardens, planning for home gardens, landscape gardens, experimental designs, fruit culture, vegetable propagation, cultivation of fruits & vegetables and its preservation, management of orchards, present situation of cultivation of different fruits, Vegetative propagation, different methods of vegetative propagation of fruits and flowers. cultivation of vegetables & spices, present situation in the cultivation of different vegetable crops, cultivation of flowers, climbers, foliages & other crops, cultivation of mushroom, care and management of potted plants, pest management, classes of insect pests diseases, integrated pest management, Seed production, marketing & trade management, quality of seeds and classification of seeds, Inventory control & maintenance of records, markets and marketing, trade and trading, methods of management of store, types of market, export of products etc.

2. Training scheme

The (NSQF) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the aegis of NSQF. Horticulture Science and Technology with variants and Apprenticeship Training Scheme (ATS) are two pioneer schemes of NSQF for strengthening vocational training.

'Horticulture Science and Technology' is one of the popular courses delivered nationwide through network of NSQF. The course is of three years duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while Core area (Employability Skills) imparts requisite core skill & knowledge and life skills. After passing out the training program at every level the trainee is awarded by Certificate given by college and university which is recognized worldwide.

Candidates require broadly demonstrating that they are competent to:

1. Read and interpret technical parameters/ documents, plan and organize work processes, identify necessary materials and tools;

2. Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations; Apply professional skill, knowledge & employability skills while performing jobs.
3. Document the technical parameters related to the task undertaken.

2.1 Development pathways

1. Can join as Horticultural consultants, Horticultural technician, Plant Care Worker, Nursery Staffer, Pest Management, Horticultural Inspector, Gardener, General, Nurseryman, Planter.
2. Can become Entrepreneur in the related field.
3. Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate(NAC).
4. Can join Master Degree (Vocational) courses under NSQF as applicable.

3. LEARNING OUTCOME

Learning outcomes are a expression of total competencies of a learner and assessment will be carried out as per the assessment criteria.

LEARNING OUTCOMES (TRADE SPECIFIC)

1. Recognize metrological instruments and the miscellany within the vocation of horticulture subsequent safety precautions.
2. Preparation and organize life cycles of plants, scope of horticulture and introduction to fruits, flowers & vegetables.
3. Categorize fruits and vegetables based on season and edible parts.
4. Set up agro-meteorology instruments, scrutinize metrological information and document the data.
5. Classify, select and maintain different farm power machinery.
6. Evaluate physical and chemical properties of soil, soil pH, different methods and ingredient use for correction of Acid soil.
7. Arrange, install and use different irrigation systems, Water lifting systems and water quality Assessment systems.
8. Identify diverse types of soil, methods of soil sampling and collection, study on soil physical characters, know soil test reports and different soil correction methods.
9. Study soil water holding capacity, Different methods and ingredients used for correction of Saline soil. Field visit for identification of soil troubles.
10. Plan and implement different soil correction method through drainage and agronomic practices.
11. Determine soil fertility and apply soil fertility management for enhancement of fertility of soil.
12. To concern Integrated Nutrient Management System (INMS) in the field.

13. Identify, set up and apply Bio-fertilizers.
14. Recognize the role of major and minor plant nutrients and its deficiency symptoms.
15. Produce special types of fruits, vegetables and flowers as per the requirements.
16. Use appropriate various cultivation techniques & methods to fruit crops & vegetable farms.
17. Preparation and implement different garden layouts and designs.
18. Identify and select different Vegetative propagation method & utilization of plant hormones.
19. Apply propagation techniques viz cutting, grafting, budding and layering.
20. Process and preserve vegetables and fruits using different techniques to prepare jam, jelly, squash, sauce, pickle, ketchup etc. its preservation and storage.
21. Develop the Cultivation techniques of different vegetables and spice crops.
22. Perform Floriculture and cultivation techniques for different Flowers, Climbers, Foliages and Medicinal plants to decorate.
23. Perform Cultivation of wild seasonal herbaceous flowering plants, wild tuberous plants, Betel Vine and Mushroom farming.
24. Apply Pest Management and control the Pest and Diseases of Horticultural Crops.
25. Use techniques of Seed Production, Processing and Packaging.
26. Maintain the records viz. Inventory Control, Maintenance of Records and Store management.
27. Conduct Market Survey and follow the legal requirement for trading as part of entrepreneurship development.
28. Develop the tissue culture techniques of different wild ornamental edible fruit and aromatic and medicinal plants.

JOB ROLE

Gardener, General; (Mali General) grows flowers, trees, shrubs, seedlings, vegetables, etc. in public or private gardens. Prepares soil and sows seeds, plants, seedlings etc. Waters seed-beds and growing plants. Weeds and hoes garden and prunes hedges and bushes. Sprays and dusts pesticides and evolves other measures to protect plants from diseases and wild animals. Prepares soil and lays lawn. Waters mows and levels lawns. Prepares paths and ensures their proper up-keep. Collects and preserves seeds for sowing. Supervises labourers engaged for assistance. Keeps implements etc. in good working order. May maintain green house for display. May cultivate vegetables and fruit trees. May specialize in ornamental gardening. May work in nursery for improving variety of plants from seeds, cuttings, grafting or budding and be designated as MALI, NURSERY. May sell plants, buy seeds, fertilizers, insecticides, etc. May pay wages to labourers employed.

Nurseryman; Mali, Nursery manages nursery on own account, or on behalf of employer to grow trees, plants, flowers, shrubs, creepers, seeds, bulbs etc. in open air or green houses for sale to customers. Decides kind and number of plants to be grown and method of planting, cultivating and treatment based on soil, climatic conditions, irrigation facilities etc. Selects and purchases seeds, fertilizers, insecticide. Equipment and machinery and other items. Plans preparation of beds and method of planting, depending on type of plants to be grown. Prepares bed by various processes such as breaking soil, mixing fertilizers, etc. sows seeds, plants, seedlings, cuttings or propagates plants by grafting, budding and other methods and makes water channels. Watches growth of sapling, seedlings, grafts and plants. Hoes and prunes excess growth and off-shoots of plants, dusts and sprays pesticides and takes other measures to protect plants from pests, wild animals, etc. Observes development of plants. Develops methods of grafting and budding./ Collects and preserves seeds for sale. Hires labour if necessary and undertakes planting, weeding, pruning etc. as

required. Supervises their work and trains them. Maintains buildings and equipment in good condition. Keeps records of cost and production statement. Sells seedling, seeds, bulbs etc. May specialize in landscape planting.

Planter; manages plantation on own account to grow plantation crops such as tea, coffee, rubber, etc. Arranges to procure seed according to type of crop such as tea, coffee, rubber, etc. Determines kinds of crop to be grown. Gets land cleared and prepared for growing crops by digging, ploughing, harrowing etc. Organizes and supervises various farm operations, sowing, manuring, weeding, spraying insecticide, and protection of crop from destruction by wild animals. Arranges harvesting of crop and supervises plucking, tapping and threshing of leaves, etc. Ensures proper maintenance and development of plantation estate. Maintains records relating to cost of production, sale and other accounts. May conduct research and organize demonstration. May arrange preservation of produce and partially process them prior to marketing. Is designated as Planter, Tea; Planter, Coffee; Planter, Cinchona; Planter, Cocoa; Planter, Rubber according to type of crop grown.

Key Features: Objectives

- i) To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- ii) To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- iii) To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- iv) To integrate NSQF within the undergraduate level of higher education to enhance employability of the students and meet industry requirements. Such student apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- v) To provide vertical mobility to students admitted in such vocational courses.

The certification levels will lead to Diploma/Advanced Diploma/B. Voc. Degree in Industrial Tool Manufacturing and will be offered by respective affiliating University.

Students may be awarded Level Certificate/Diploma/Advance Diploma /Degree as out-lined in the Table below:

Award	Duration after class X II	Corresponding NSQF level
Certificate	Sixth month	5
Diploma	1 Year	6
Advance Diploma	2 Year	7
B.Voc. Degree	3 Year	8

Course Structure

The course will consist of combination of practice, theory and hands on skills in the Capital Goods Sector.

Curriculum

The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components.

Skill Development Components:

The focus of skill development components shall be to equip students with appropriate knowledge, practice and attitude, to become work ready. The skill development components will be relevant to the industry as per its requirements.

The curriculum will necessarily embed within itself, National Occupational Standards (NOSs) of specific job roles within the industry. This would enable the students to meet the learning outcomes specified in the NOSs.

The overall design of the skill development component along with the job roles selected will be such that it leads to a comprehensive specialization in few domains.

The curriculum will focus on work-readiness skills in each of the year of training.

Adequate attention will be given in curriculum design to practical work, on the job training, development of student portfolios and project work. Industrial Tool Manufacturing

A] Ordinance and Regulations: (As applicable to Degree vocational Course)

B] Shivaji University, Kolhapur

Syllabus For Bachelor vocational course in Horticulture Science and technology

1. TITLE: Subject- Horticulture Science and technology

Under the Faculty of interdisciplinary studies

2. YEAR OF IMPLEMENTATION:- Syllabi will be implemented from June 2020 onwards.

3. PREAMBLE:-

[Note :-The Adhoc Board of Studies should briefly mention foundation, core and applied components of the course/paper. The student should get into the prime objectives and expected level of study with required outcome in terms of basic and advance knowledge at examination level.]

4. DURATION

B. Voc. Part I, II and III (Three Years)

B. Voc. Part I - Diploma (One Year)

B. Voc. Part II - Advanced Diploma (Second Year)

B. Voc. Part III- Degree (Third Year)

5.STRUCTURE OF COURSE :

B. Voc. Part – I, II and III

Two Semester Per Year

One general Papers per year / semester

One elective course paper per semester

Three Core course papers /Vocational Papers per semester

Five Practical papers per semester

One Project / Industry Visit/ Study Tour / Survey/Internship/Hands on training.

7. INTAKE CAPACITY :

50 Students

6. SCHEME OF EXAMINATION

Evaluation System: The evaluation system will be the same as followed by the Shivaji University, Kolhapur. This course is consists of a six semester and shall have a weight age for Internal Exams and for term end exams.

The achieved marks and percentage shall be conversion as determined below.

Grades and Grade Points

Letter Grade	Grade Points
O (Outstanding)	10
A+ (Excellence)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

Theory Examination– Attends of semester as per Shivaji University rules.

A) THEORY

The theory examination shall be at the end of the each semester. All the general theory shall carry 50marks, elective and vocational theory papers shall carry 50marks. Evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above. The question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.

Nature of question paper for Theory examination (Excluding Business Communication Paper)–

Q.1 Multiple choice (08)	08 mks
Q.2 Long answer type (any two) out of three	16 mks
Q.3 Write short notes (any four) out of six	16 mks
Internal evaluation	10mks

B) PRACTICAL

Each semester there will be external practical examination attendant of semester.

Evaluation of the performance of the students in practical shall be on the basis of semester examination.

Each paper having separate practical (EC/CC) 50 mks

C) Project /field visit/ internship/fieldwork/Hands on training.

Standard of Passing:

As per the guidelines and rules for B. Voc. (Attached Separately – Annexure I)

7. FEE STRUCTURE:

As per Government/University rules.

1. Refer website of concern affiliated college/institute to Shivaji University, Kolhapur.
2. Other fee will be applicable as per rules and norms of UGC and Shivaji University, Kolhapur.

8. ELIGIBILITY FOR ADMISSION:

As per guidelines obtained from UGC, NSQF and Shivaji University, Kolhapur by following rules and regarding reservations by Govt. of Maharashtra.

9. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English.

10. STRUCTURE OF COURSE- B. Voc. Horticulture Science and Technology.

11. Eligibility for Admission : 10 + 2 from any faculty or equivalent Diploma /Advanced Diploma in any related stream.

12. Eligibility for Faculty : 1) M. Sc. (Horticulture/Botany) with NET / SET/ Ph.D.
2) M.A. (English) with NET/SET Ph.D. for Communication skill.

13. Eligibility for Laboratory Assistant cum clerk: B.Sc. (Horticulture/Botany) with MSCIT

14. Eligibility for Laboratory attendant cum gardener: Diploma in Agriculture/B.Sc. in Botany.

15. Staffing Pattern:

Teaching:

In 1st Year of B. Voc. 1 Full Time and 1 Part Time Lecturer and 1 CHB Lecturer for Business communication. In 2nd Year of B. Voc. Total requirement of faculty (Inclusive of 1st Year) will be 3 Full time and 1 CHB Lecturer for Financial Accounting 1 CHB, Lecturer for Business Communication. 3rd Year of B. Voc. – Total requirement of faculty (Inclusive of 1st & 2nd Year) will be 4 Full time and 1 part time and 1 CHB Lecturer for Business Communication.

SHIVAJI UNIVERSITY, KOLHAPUR
STRUCTURE AND SYLLABUS OF B.VOC.
Bachelor of Vocational (B.Voc.) – Horticulture Science And Technology

Semester –V

Credits: 30

Course no.	Courses	Distribution of Marks				Credits			
		T	Internal	P	Project/Field visit/ Internship/ Field work	T	P	Project/Field visit/ Internship/ Field work	Total
BVHSTCS121	Communication skills and personality development -I	40	10	50		2			2
BVHSTEC122	Fruit And vegetable processing	40	10	50		3	4		7
BVHSTCC 123	Green house technology	40	10	50		3	4		7
BVHSTCC 124	Landscape Architecture	40	10	50		3	4		7
BVHSTCC 125	Nutrition of Horticultural Crops and its Management	40	10	50		3	4		7
	Project/Field visit/ Internship/ Field work /Hands on training based on practical								
Total		160	40	250		14	16		30

Semester VI

Credits: 30

Course no.	Courses	Distribution of Marks				Credits			
		T	Internal	P	Project/Field visit/ Internship/ Field work	T	P	Project/Field visit/ Internship/ Field work	Total
BVHSTCS126	Hortipreneurship development and Business Management-II	40	10	50		2			2
BVHSTEC127	Post harvesting management of Horticulture product	40	10	50		3	4		7
BVHSTCC 128	Food Beverages	40	10	50		3	4		7
BVHSTCC 129	Processing of Horticulture Product	40	10	50		3	4		7
BVHSTCC 130	Fundamentals of Entomology ,pest of fruit ,vegetable and flower	40	10	50		3	4		7
	Project/Field visit/ Internship/ Field work /Hands on training based on practical								
Total		160	40	250		14	16		30

***BVHSTCS: Bachelor of Vocational Horticulture Science And Technology Communication Skill.**

***BVHSTEC: Bachelor of Vocational Horticulture Science And Technology Elective Course.**

***BVHSTCC: Bachelor of Vocational Horticulture Science And Technology Core course.**

*** T: Theory**

*** P: Practical**

**** Non credit courses must be completed as per guidelines of Shivaji University, Kolhapur.**

SHIVAJI UNIVERSITY, KOLHAPUR
Bachelor of Vocational (B.Voc.) – Horticulture Science And Technology
Scheme of Teaching: B.Voc. - Part V and VI Semester
Semester V

Course no.	Courses	Distribution of Work load (Per Week)	
		Theory	Practical
BVHSTCS121	Communication skills and personality development -I	4	
BVHSTEC122	Fruit And vegetable processing	3	5
BVHSTCC 123	Green house technology	3	5
BVHSTCC 124	Landscape Architecture	3	5
BVHSTCC 125	Nutrition of Horticultural Crops and its Management	3	5
	Project/Field visit/ Internship/ Field work /Hands on training based on practical	-----	
Total		16	20

Semester VI

Course no.	Courses	Distribution of Work load(Per Week)	
		Theory	Practical
BVHSTCS121	Communication skills and personality development -I	4	
BVHSTEC122	Fruit And vegetable processing	3	5
BVHSTCC 123	Green house technology	3	5
BVHSTCC 124	Landscape Architecture	3	5
BVHSTCC 125	Nutrition of Horticultural Crops and its Management	3	5
	Project/Field visit/ Internship/ Field work /Hands on training based on practical	-----	
Total		16	20

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part –III
Horticulture Science and Technology
Communication skills and personality development -I
Course no. BVHSTCS121

Total Workload: 02 lectures per week of 50 mins.

Distribution of Workload:

Theory: 04 lectures per week

Credits 2

Practical: 02 lectures per week per batch of 20 students

Module I: **5**

- 1.1 Definition and Basics of Personality.
- 1.2 Analyzing Strength and Weakness.
- 1.3 Personality Development : Concept and Process.

Module II: **8**

- 2.1 Body Language – Meaning, Definition, Use of body language - Gesture, Posture, Eye contact, Facial expression
- 2.2 Preparation of Self -Introduction.
- 3.3 Communication Skills: Listening, writing, speaking skills
- 3.4 Communication Barriers; Overcoming these barriers.

Module III: **8**

- 3.1 Building Self-Esteem and Self- Confidence.
- 3.2 Attitudes: Meaning, Types - Assertive, Aggressive and Submissive; Positive, Negative, Neutral
- 3.3 Introduction to Leadership; Leadership Styles; Group Dynamics.

Module IV: Interview Technique **9**

- 4.1 Team Building : Meaning, Steps
- 4.2 Interpersonal Communication and Relationship; Use of verbal and non verbal communication.
- 4.3 Conflict Management: Introduction, Levels of Conflict and Managing Conflict.
- 4.4 Time Management: Concept, Importance and Need, Steps towards better Time Management.
- 4.5 Public Speaking: Introduction, Increasing Vocabulary, Voice Modulation, Social Graces
- 4.6 Email and Telephone Etiquettes

Practicals Based on theory

- Course outcome:**
- i) To develop the knowledge about basics of Personality
 - ii) To develop the knowledge about Leadership
 - iii) To develop the knowledge about interpersonal Communication and Relationship
 - iv) To develop organization skill, managerial skills and problem solving skills.
 - v) To develop communication skills for marketing products

Reference Books:

1. Balasubramanyam M. 1985. Business Communication. Vani Educational Books, New Delhi.
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3. Mohan Krishna and Meera Banerjee. 1990. Developing Communication Skills. Macmillan India Ltd. New Delhi.
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12. Meenakshi Raman, Sangeeta Sharma. *Technical Communication Principles and Practice*
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e-reading:<http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part –III
Horticulture Science and Technology
Semester V
Fruit And Vegetable Processing
Course no. BVHSTEC122

Work Load: 08

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Credits 03+04

Theory: 50 Marks

Practical: 50 Marks

Module I

09

- 1.1 Importance and scope of fruit and vegetable preservation industry in India.
- 1.2 Food pipeline, losses in post-harvest operations.
- 1.3 Unit operation in food processing.

Module II

10

- 2.1 Principles and guidelines for the location of processing units.
- 2.2 Principles and methods of preservation by heat pasteurization, canning and Bottling.
- 2.3 Methods of preparation of juice, squash, syrup, wine, neera, Jam and jelly.

Module III

10

- 3.1 Preservation by sugar and chemicals; candies and crystallized fruits
- 3.2 Preservation with salt and vinegar.
- 3.3 Preparation and preservation of Pickles, chutneys, sauces, tomato and mushrooms.

Module IV

16

- 4.1 Processing of plantation crop products e.g Custard apple, Grape and Pomegranate.
- 4.2 Spoilage in processed foods, quality control of processed products.
- 4.3 Govt. policy on import and export of processed fruits. Food laws.

Course outcome: i) Acquire the knowledge about fruit and vegetable processing.
ii) Acquire the knowledge about preservative techniques.
iii) Acquire the knowledge about Govt. policy on import and export of processed fruits.

References:

1. Bhatti, S. 1995. Vame, Fruit and vegetable processing. CBS Publishers, Distributors, New Delhi.
2. Chadha, K. L. 2003. Hand book of horticulture, ICAR, New Delhi.
3. Chadha, K. L. and Kalloo, G. 1993. Advances in Horticulture. Vol. 4 to 10. MPH, New Delhi
4. Dauthy and Mircea, E. 1995. Fruit and vegetable processing. International Book Distribution Co, Lucknow.
5. Dauthy, M. E. 1995. Fruits and Vegetables Processing- FAO Bulletin 119. International Book Distributing Co., Lucknow.
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e-reading: <http://ecourses.iasri.res.in/>

www.fssai.org

http://www.fao.org/infoods/index_en.stm

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester V
Green House Technology
Course no. BVHSTCC123

Work Load-08

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I

09

- 1.1 Precision farming – laser levelling, mechanized direct seed sowing, seedling and sapling Transplantation.
- 1.2 Mapping of soils and plant attributes ,site specific input application.
- 1.3 Management of weeds, insect pests and diseases; yield mapping in horticultural crops.

Module II

09

- 2.1 Green house technology: Introduction Importance, scope, advantages and dis-advantages
- 2.2 Types of Green Houses; design of greenhouses.
- 2.3 Greenhouse cooling and heating.

Module III

12

- 3.1 Green house equipment, materials for construction of traditional and low cost green houses.
- 3.2 Irrigation systems used in greenhouses, Typical applications, passive solar green house, hot air greenhouse heating systems, green house drying.
- 3.3 Cost benefit analysis.

Module IV

15

- 4.1 Choice of crops for cultivation under greenhouses, problems / constraints of green house cultivation and future strategies.
- 4.2 Growing media, soil culture, type of soil required, drainage, flooding and leaching.
- 4.3 Post production management of green house product(flower)

Course outcome:

- i) Acquire the knowledge about green house management.
- ii) Acquire the knowledge about various operations carried out in green house.
- iii) Acquire the knowledge about cost estimation and economic analysis.

References:

1. Aldrich R A and Bartok J W. 1994. NRAES, Riley, Robb Hall. Green House Engineering. Cornell University, Ithaca, New York.
2. Balraj Singh. 2006. Protected cultivation of vegetable crops. Kalyani Publishers, Ludhiana.
3. Brahma Singh, 2014. Advances in Protected Cultivation. New India Publishing Agency. New Delhi.
4. Jitendra Singh, 2015. Precision Farming in Horticulture. New India Publishing Agency. New Delhi.
5. Jitendra Singh, S.K. Jain, L.K. Dashora, B.S. Cundawat. 2013. Precision forming in
6. Horticulture. New India Publishing Agency, New Delhi.
7. Pant V Nelson. 1991. Green House Operation and Management. Bali Publication.

8. Prasad S. 2005. Greenhouse Management for Horticultural Crops. Agrobios. Jodhpur.
 9. Reddy P. Parvatha, 2003. Protected Cultivation. Springer Publications. USA.
- e-reading:* <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester V
Landscape Architecture
Course no. BVHSTCC124

Work Load-08

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I **10**

- 1.1 History, definitions and industrial importance of ornamental plants and flowers.
- 1.2 Importance, classification, design values and general cultivation aspects for ornamental plants viz. Annuals, biennales herbaceous perennials, grasses and bulbous ornamentals.
- 1.3 Importance, classification, design values and general cultivation aspects for ornamental plants viz. shrubs, climbers, trees, indoor plants, palms and cycads, ferns, cacti and succulents.

Module II **12**

- 2.1 Importance, design and establishment of garden features/components viz. hedge, edge, borders, flower beds, bridges, paths, drives, fences, garden walls, gates, carpet bed, arbour.
- 2.2 Importance, design and establishment of garden features/components viz. Patio, decking, retaining walls, shade garden, sunken garden, roof garden, terrace garden, pebble garden, rockery.
- 2.3 Importance, design and establishment of garden features/components viz. Pools, waterfalls, mountains, bog garden, avenue planting and children garden.

Module III **08**

- 3.1 Lawn types, establishment and maintenance
- 3.2 Importance of Garden adornments viz. floral clock, bird bath, statues, sculptures.
- 3.3 Importance of Garden adornments viz. lanterns, water basins, garden benches.

Module IV **15**

- 4.1 Importance of flower arrangement, Ikebana, techniques, types, suitable flowers and cut Foliage.
- 4.2 Public parks and Botanical gardens.
- 4.3 Uses of vertical garden, bottle garden, terrariums and maintenance.

Course outcome:

- i) Acquire the knowledge about green house management.
- ii) Acquire the knowledge about various operations carried out in green house.
- iii) Acquire the knowledge about the cost estimation and economic analysis.

References

- 1. Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana
- 2. Bimaldas Chowdhury and Balai Lal Jana. 2014. Flowering Garden trees. Pointer publishers, Jaipur. India.

3. Bose, Chowdhury and Sharma.1991.Tropical Garden Plants in colour .Horticulture and allied publishers, 3D Madhab Chatterjee street Kolkata.
 4. Bose, T.K. Mukherjee, D. 2004. Gardening in India. Oxford & IBH Publishers.
 5. Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication AndInformationdivision. ICAR, New Delhi.
 6. K.V.Peter.2009.Ornamental plants. New India publishing agency, Pitampura, New Delhi.
 7. Randhawa, G.S. AmitabhaMukhopadhyay, 2004. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi.
 8. Richard Bird. 2002. Flowering trees and shrubs. Printed in Singapore by Star Standard Industries pvt. Ltd.
- e-reading:* <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester V

Nutrition of Horticultural Crops and its Management
Course no. BVHSTCC125

Work Load-08

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Course content:

Theory

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I **15**

- 1.1 Introduction, definition – difference between manures and fertilizers – classification of manures with suitable examples -importance of manures in Soil fertility management.
- 1.2 Compost and composting-different methods of composting including the starters and raw materials, methods of preparations of rural and urban compost . Mechanical compost plants- Vermi composting .
- 1.3 Bulky organic manures-Preparation of FYM – Methods of collection and storage .Losses of nutrients from FYM during collection ,storage and ways to minimize these losses .
- 1.4 Biogas plant – principles of operation and its advantages .Green manures and green leaf manures.

Module II **12**

- 2.1. Commercial fertilizers: Nitrogenous fertilizers – Manufacturing process and properties of nitrogenous fertilizers viz, Ammonia, Ammonium sulphate.
- 2.2 Manufacturing process and properties of nitrogenous fertilizers viz. Urea and calcium ammonium nitrate . Slow releasing N Fertilizers .
- 2.3 Potassic fertilizers – Mineral sources - Manufacturing process and properties of Muriate of potash and sulphate of potash – mode of action of N ,P and K fertilizers in soil.
- 2.4 Phosphatic fertilizers -Rock phosphate-uses –occurrences, types and properties. Manufacturing process and properties of SSP , TSP and Basic slag .

Module III **10**

- 3.1 Granulation, unit value , grade and ratio of fertilizers .Computation of fertilizers mixture Combined application of fertilizers and Agricultural chemicals, Precautions and Compatibility.
- 3.2 Fertilizer and efficiency-soil, plant, and fertilizer and management factors influencing FUE –Measures to improve the use of N,P and K fertilizers.
- 3.3 Biofertilizers – Methods of preparations and uses in Horticulture.

Module IV **08**

- 4.1 Secondary and micronutrient fertilizers – Conditions leading to their deficiency importance of uses of different sources and their content. Mode of action of “S” fertilizers in soils.
- 4.2 Compound and Complex fertilizers used in India , MA[, DAP , UAP ,APS Nitro phosphates and NPK complexes , manufacturing process and properties.
- 4.3 Mixed and bulk blended fertilizers . Dry and wet process of mixing–advantages and disadvantages of mixed fertilizers over straight fertilizers .Physical and chemical problems in their preparation .

Course outcome:

- i) Acquire the knowledge of Preparation of various fertilizers.
- ii) Acquire the knowledge of processing of fertilizers.
- iii) Acquire the knowledge of Secondary and micronutrient fertilizers.

References:

1. Yawalkar, K.S Agarwal, J.P. and Bokde, S. 1977. Manures and Fertilizer Agri-Horticultural Publishing House, Nagapur.
2. Seothavanam, S. Biswas, B.C. Maheswari, S. and Yadav, D.S. 1986 – Hand Book on Fertilizers Technology – The Fertilizers Association of India, New Delhi.
3. Tisdale, S.L. Nelson, W.L. and Beaton J.D. 1993 Soil Fertilizer and Fertilizers – Mac Millan, Publising Co. New York.
4. *e-reading:* <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part –III
Horticulture Science and Technology
Semester V
Fruit And Vegetable processing
Practical: I
Course no. BVHSTEC122

Work Load:5

Practical: 5 Lectures/Week/Batch

Credits:04

Practical: 50 Marks

1. Equipment's used in food processing units
2. Types of containers used for processing of fruits and vegetables.
3. Dehydration of fruits and vegetables.
4. Canning of fruits- mango, pineapple, guava.
5. Canning of vegetables- peas, tomato.
6. Processing of plantation of oil crops.
7. Preparation of squash and syrup.
8. Spoilage of processed products.
9. Preparation of jam and jelly.
10. Preparation of candies and tomato ketchup.
11. Preparation of chutneys.
12. Preparation of hot pickles and sweet pickles.
13. Refrigeration and freezing.
14. Project/Field visit/ Internship/ Field work /Hands on training

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester V
Practical: II
Green House Technology
Course no. BVHSTCC123

Work Load-5

Practical –5 Lectures/Week/Batch

Credits: 04

Practical: 50 Marks

1. Study of different types of greenhouses based on shape, utility, construction and cladding materials.
2. Calculation of air rate exchange in an active summer winter cooling system.
3. Estimation of drying rate of agricultural products inside green house.
4. Testing of soil and water to study its suitability for growing crops in greenhouses.
5. The study of fertigation requirements for greenhouses crops and estimation of E.C. in the fertigation solution.
- 6-7. The study of various growing media used in raising of greenhouse crops and their preparation and pasteurization sterilization.
8. Cultivation of solanaceous crops under protected cultivation (Capsicum, Tomato)
9. Cultivation of Cucurbits under protected cultivation with mulches.
10. Cultivation of Summer squash under protected cultivation with mulches.
11. Cultivation of melons and beans under protected cultivation with mulches.
12. Cultivation of spinach, coriander.
13. Visit to commercial greenhouses.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part –III
Horticulture Science and Technology
Semester V
Practical III
Landscape Architecture
Course no. BVHSTCC124

Work Load-5

Practical: 5 Lectures/Week/Batch

Credits: 04

Practical: 50 Marks

1. Study of garden equipments
2. Identification and description of annuals, herbaceous, perennials.
3. Identification and description of trees, palms, ferns.
4. Identification and description of hedges and edges.
5. Planning and designing virtual garden
6. Use of drawing equipments, graphic symbols and notations in landscape designing.
7. Functional uses of plants in the landscape.
8. 9. Designing gardens using Auto-CAD/ Archi-CAD.
10. Study and designing of different styles of gardens.
11. Study and designing of gardens based on different themes.
12. Layout of recreational and children's corner, terrarium.
13. Designing gardens for specific places.
14. Visit to public/ institutional / botanical gardens

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester V
Practical IV

Nutrition of Horticultural Crops and its Management
Course no. BVHSTCC125

Work Load-5

Credits: 04

Practical: Lectures/Week/Batch

Practical: 50 Marks

1. Sampling of organic manures and fertilizers for chemical analysis.
2. Physical properties of manures and fertilizers.
3. Quick tests for identification of important fertilizers.
4. Detection of adulteration in fertilizers.
5. Estimation of ammonical nitrogen in ammonical fertilizers (Ammonium sulphate).
6. Estimation of nitrate nitrogen and ammonical nitrogen (Ammonium nitrate).
7. Estimation of total nitrogen Urea.
8. Estimation of Total nitrogen in Farm Yard manure.
9. Estimation of water soluble P₂O₅ in SSP.
10. Estimation of Potassium in MOP/SOP.
11. Estimation of Zinc in Zinc sulphate.
12. Determination of Calcium in SSP or Lime.
13. Visit to fertilizer testing laboratory.
14. Visit to Vermicomposting unit.

SHIVAJI UNIVERSITY, KOLHAPUR
Bachelor of Vocational (B.Voc.): Horticulture Science And Technology
Scheme of Teaching: B.Voc. - Part III

Semester VI

Credits: 30

Course no.	Courses	Distribution of Marks				Credits			
		T	Internal	P	Project /Field visit/ Internship/ Field work	T	P	Project/Field visit/ Internship/ Field work	Total
BVHSTCS126	Hortipreneurship development and Business Management-II	40	10	50		2			2
BVHSTEC127	Post harvesting management of Horticulture product	40	10	50		3	4		7
BVHSTCC 128	Food Beverages	40	10	50		3	4		7
BVHSTCC 129	Processing of Horticulture Product	40	10	50		3	4		7
BVHSTCC 130	Fundamentals of Entomology ,pest of fruit ,vegetable and flower	40	10	50		3	4		7
	Project/Field visit/ Internship/ Field work /Hands on training based on practical								
Total		160	40	250		14	16		30

Semester VI

Course no.	Courses	Distribution of Work load (Per Week)	
		Theory	Practical
BVHSTCS126	Hortipreneurship development and Business Management-II	4	
BVHSTEC127	Post harvesting management of Horticulture product	3	5
BVHSTCC 128	Food Beverages	3	5
BVHSTCC 129	Processing of Horticulture Product	3	5
BVHSTCC 130	Fundamentals of Entomology ,pest of fruit ,vegetable and flower	3	5
	Project/Field visit/ Internship/ Field work /Hands on training based on practical	-----	
Total		16	20

***BVHSTCS: Bachelor of Vocational Horticulture Science And Technology Communication Skill.**

***BVHSTEC: Bachelor of Vocational Horticulture Science And Technology Elective Course.**

***BVHSTCC: Bachelor of Vocational Horticulture Science And Technology Core course.**

*** T: Theory**

*** P: Practical**

**** Non credit (Non CGPA)courses must be completed as per guidelines of Shivaji University, Kolhapur.**

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Hortipreneurship development and Business Management-II
Course no. BVHSTCS126
Semester–VI

Distribution of Workload:

Credits 2

Theory:04 lectures per week

Practical:02 lectures per week per batch of 20 students

Modules Prescribed for Theory:

Module I:

7

Entrepreneur : Meaning, definitions, characteristics of entrepreneurship, Assessment of entrepreneurship skills, identifying potential entrepreneurs Entrepreneurship development- Concept of entrepreneurship, Process of entrepreneurship development, Achievement motivation and entrepreneurship development. Generation, incubation and commercialization of business ideas and innovations.

Module II:

8

SWOT analysis: Concept and technique

Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs/SSIs)

Supply chain management, Time management and Total quality management

Module III:

7

Market Survey : Meaning, objectives, methods of conducting survey

Formulation of project, financial analysis of project

Overview of horti input industry characteristics of Indian horticultural processing and export industry. Business Communication

Module IV:

8

Communication – Meaning and process of communication

Communication skills for entrepreneurship – Written communication, Verbal communication, Investigating and analyzing, Planning and Organizing, Negotiating and persuading, Cooperative (Team work), Leadership and Numeracy

Developing different skills for entrepreneurship - Leadership, Speaking, Listening Skills, Organizational, Managerial and Problem solving skill,

Writing Skill – Business letter, letters of enquiry, quotation, orders, and tenders, complaint Letter.

Oral presentation skills – Preparation, presentation and evaluation

Advertisements – Meaning, types, forms, functions.

Practicals Based on theory

Course outcome:

- i). Skill oriented course useful for marketing and entrepreneurship
- ii). Course is framed for overall personality development of the students.
- iii). To develop leadership qualities through organization of various events.

- iv). To develop organization skill, managerial skills and problem solving skills.
- v). To develop communication skills for marketing products

ReferenceBooks:

1. Akhouri, M.M.P., Mishra, S.P. and Sengupta, Rita (1989). Trainers Manual on
2. Developing Entrepreneurial Motivation, NIESBUD, New Delhi
3. Betty, Gorddan B. (1979). Entrepreneurship, Playing to Win, Taraporewala, Mumbai
4. Entrepreneurship Development Institute in India (1987). Developing New Entrepreneurs, EDII, Ahmedabad, NISIET, Library : 338.93/EDI/87/25104.
5. Mancuso, Joseph (1974). The Entrepreneurs Handbook, Vol.I & II, Artech House Inc.USA.
6. Patel, V.G. (1987). Entrepreneurship Development in India and its relevant Developing Countries, Entrepreneurship Development Institute of India, Ahmedabad, NISIET, Library : 338.93 (540)/PAT/87/25103.
7. Singh, A.K., Lakhan Singh, R. and Roy Berman (2006). Dimensions of Agricultural Extension, Aman Publishing House, Meerut.

e-reading:<http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Post harvesting management of Horticulture product
Semester VI
Course no. BVHSTEC127

Work Load:8

Theory: 3 Lectures/Week

Practical:5 Lectures/Week/Batch

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I

10

- 1.1 Importance of postharvest technology in horticultural crops.
- 1.2 Maturity, types and factors affecting maturity of horticultural crops.
- 1.3 Maturity indices, harvesting, handling, grading of fruits, vegetables, cut flowers, plantation crops, medicinal and aromatic plants.

Module II

11

- 2.1 Pre-harvest factors affecting quality, factors responsible for deterioration of horticultural produce.
- 2.2 Hardening and delaying ripening process.
- 2.3 Physiological and biochemical changes.

Module III

12

- 3.1 Postharvest treatments of horticultural crops.
- 3.2 Quality parameters and specification of horticultural produce.
- 3.3 Structure of fruits, vegetables and cut flowers related to physical changes after harvest.

Module IV

12

- 4.1 Methods of storage for local market and export.
- 4.2 Pre-harvest treatment, pre-cooling and pre-storage treatments.
- 4.3 Different systems of storage, packaging methods and types of packages, recent advances in packaging. Types of containers and cushioning materials, vacuum packaging, cold storage, and poly shrink packaging, grape guard packing treatments. Modes of transport.

Course outcome:

- i) Acquire the knowledge about postharvest technology
- ii) Acquire the knowledge about deterioration, hardening
- iii) Acquire the knowledge about quality parameters.

References:

1. Battacharjee, S. K. and De, L. C. 2005. Post Harvest Technology of Flowers and Ornamentals Plants. Ponteer Publisher, Jaipur, India.
2. Chadha, K. L. and Kalloo, G. 1993. Advances in Horticulture. Vol. 4 to 10. MPH, New Delhi.
3. Fellows, P. J. 1998. Food Processing Technology – principles and Practices. Ellis Horwood.
4. Hulme, A.C. 1970. Food Science & Technology - A Series of Monograph. The Biochemistry of Fruits and their Products. Vol.-1. Academic Press London & New York.
5. Jacob John, P. 2008. A Handbook on Post Harvest management of Fruits and vegetables. Daya Publishing House, Delhi-1081-7035-532-X.

6. Kitinoja, L. and Kader, A. A. 2003. Small-Scale Postharvest Handling practice: A Manual
 7. Horticulture crops (4th ed.). US Davis, PHT Research and information Center.
 8. Kitinoja, L. and Kader, A. A. 2003. Small-Scale Postharvest Handling practice: A Manual for Horticulture crops (4 ed). US Davis, PHT Research and information Center.
 9. Mitra, S. K. 1997. Post Harvest Physiology and Storage of Tropical and Sub-tropical Fruits. CAB International.
 10. Neetu Sharma and MashkooorAlam, M. 1998. Post Harvest Diseases of Horticultural Perishables. International Book Distributing Co., Lucknow.
 11. Pruthi, J. S. 2001. Minor Spices and Condiments – Crop Managements and Post Harvest Technology. ICAR, New Delhi.
 12. Saraswathy, S. *et. al.* 2008. Post harvest Management of Horticultural Crops. Agribios (India).81-7754-322-9.
 13. Shanmugavelu, K. G., Kumar, N. and Peter K.V. 2002. Production Technology of Spices and Plantation Crops. Agrobios (India).
 14. Stanley, J. K. 1998. Post Harvest Physiology of Perishable Plant Products. CBS, New Delhi.
- e-reading:* <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Food Beverages
Semester VI
Course no. BVHSTCC 128

Work Load-8

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I

10

- 1.1 History and importance of beverages and status of beverage industry.
- 1.2 Processing of beverages.
- 1.3 Packaged drinking water, juice based beverages.

Module II

15

- 2.1 Synthetic, still, carbonated, low-calorie and dry beverages, isotonic and sports drinks, dairy based and alcoholic beverages.
- 2.2 Fruit beverages, speciality beverages, tea, coffee, cocoa, spices, plant extracts.
- 2.3 FSSAI specifications for beverages.

Module III

10

- 3.1 Ingredients, manufacturing and packaging processes and equipment for different beverages.
- 3.2 Water treatment and quality of water for beverage industry.
- 3.3 Sweeteners, colorants, acidulants, clouding, clarifying and flavouring agents for beverages

Module IV

10

- 4.1 Carbon dioxide and carbonation.
- 4.2 Quality tests and control in beverages.
- 4.3 Miscellaneous beverages: coconut water, sweet toddy, sugar cane juice, coconut milk, flavoured syrups.

Course outcome:

- i) Acquire the knowledge about importance of beverages
- ii) Acquire the knowledge about processing of beverages
- iii) Acquire the knowledge about various beverages.

References:

1. Fruit and Vegetable Juices by Tressler D.K., Joslyn M.A. and Marsh G.C. AVI publishing company New York 1971
2. Food and Beverage Technology International USA by Bernard and Alan, Sterling Publication, 1989.
3. Beverages: Technology, Chemistry and Microbiology, Varnam and Sutherland, Springer, 1994.
4. Food Flavourings, P.R. Ashurst, Springer, 2012.
5. Handbook of Alcoholic, Beverages Alan Buglass, John Wiley and Sons, 2011
6. Preservation of Fruit and Vegetable Products, Girdharilal, Siddappa, Tondon, Indian Council of

Agricultural Research, Publications 1986
7. *e-reading*: <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR

B. Voc. Part – III

Horticulture Science and Technology

Semester VI

Processing of Horticulture Product

Course no. BVHSTCC 129

Work Load-08

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I 10

- 1.1 Production and processing scenario of fruits and vegetables in India and World.
- 1.2 Scope of fruit and vegetable preservation industry in India. Present status, constraints and prospects.
- 1.3 Principles of preservation methods of fruits and vegetables.

Module II 10

- 2.1 Commercial processing technology of fruits and vegetables.
- 2.2 Primary processing and packaging house, handling of fruits and vegetables; Peeling, slicing, cubing, cutting and other size reduction operations for fruits and vegetables.
- 2.3 Minimal processing of fruits and vegetables.

Module III 10

- 3.1 Blanching operations and equipment of Horticulture Product.
- 3.2 Canning: Definition, processing steps, and equipment, cans and containers, quality assurance and defects in canned products.
- 3.3 Preparation and preservation of juices, squashes, syrups, sherbets, nectars and cordials. Problems on squash and RTS; Processing and equipment for above products and FSSAI specification.

Module IV 15

- 4.1 Working and applications of machines used for manufacture of crystallized fruits and preserves; jam, jelly marmalades and candies.
- 4.2 Working and applications of machines used for manufacture of preserve, concentrate, fruit wine, sauerkraut, chutney, pickles, sauce, puree, paste, ketchup; toffee, cheese, lather, dehydrated wafers and papads, soup powders; FSSAI specification.
- 4.3 Production of pectin and vinegar; Commercial processing technology of selected fruits and vegetables for production of various value added processed products.

Course outcome:

- i) Acquire the knowledge about production and processing of fruits and vegetables.
- ii) Acquire the knowledge about blanching operations and equipment.
- iii) Acquire the knowledge about preparation and preservation of juices.

References:

1. Fruit and Vegetable Preservation Principles and Practices Srivastava R.P. and Sanjeev Kumar International Book Distributing Company, New Delhi 2005
2. Post Harvest Technology of Fruits and Vegetables : Handling, Processing, Fermentation and Waste Management vol. I & II Varma L. R. and Joshi V.K. Indus Publishing, 2000
3. Preservation of Fruits and Vegetables G. Lal, G.S. Siddappa, G.L. Tandan ICAR Publication, New Delhi 1996.
4. Fruit and Vegetable Processing M.G. Danthy FAO, Rome.
5. Post harvest Handling and Processing of Fruit and Vegetable I.S. Singh
6. Fruit Processing, David Arthey
7. Handbook of Fruit and Vegetable Processing Sinha and Hui John Wiley and Sons, 2010
8. Fruit and Vegetable Preservation -Principles and Practices Srivastava RP & Kumar S International Book Distributors, 2003
9. Handbook of fruit Science and technology: Production, Composition and Processing. Salunkhe DK & Kadam SS. Marcel Dekker 1995
10. *e-reading*: <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR

B. Voc. Part – III

Horticulture Science and Technology

Semester VI

Fundamentals of Entomology, Pest of Fruit, Vegetable and Flower

Course no. BVHSTCC 130

Work Load-8

Theory: 3 Lectures/Week

Practical: 5 Lectures/Week/Batch

Credits: 3+4

Theory: 50 Marks

Practical: 50 Marks

Module I

10

- 1.1 Introduction and History of Entomology in India including contribution of scientists in brief.
- 1.2 Entomology: Definition and scope.
- 1.3 Horticultural Entomology: Insect pest of fruits, vegetables and flowers

Module II

10

- 2.1 Economic importance of pests in vegetable ornamental plants, etiology and pest management.
- 2.2 Important pests of ornamental crops.
- 2.3 Pest surveillance in important ornamental crops.

Module III

10

- 3.1 Ecology and insect-pest management with reference to fruits.
- 3.2 Distribution, host range, bio-ecology, injury, integrated management of important insect pests affecting tropical, sub-tropical and temperate fruits- citrus, mango, grapevine, pomegranate, guava and banana.
- 3.3 Integrated management of important insect pests attacking under storage fruits.

Module IV

15

- 4.1 Distribution, host range, bio-ecology, injury, integrated management of important pests affecting vegetable.
- 4.2 Pests of processed vegetables their host range, bio-ecology, injury and integrated management.
- 4.3 Pest surveillance in important vegetable.

Course outcome:

- i) Acquire the knowledge about Horticultural Entomology.
- ii) Acquire the knowledge about integrated management of insect pests.
- iii) Acquire the knowledge about ecology and insect-pest management

References:

- 1. Ayyar, T.V.R. 1963, Hand Book of Economics Entomology for South India. Govt. Press Madras.
- 2. David, B.V. 2006. Elements of Economic Entomology. Popular Book Depot, Chennai.
- 3. Butani, D.K. and M.G.Jotwani, 1984. Insects of Vegetables. Periodical Expert Book Agency, New Delhi.

4. Srivastava, K.P. and D.K. Butani, 1998. Pest Management in Vegetables (Part I & II) Research Periodicals and Book Publishing House, India. 113
e-reading: <http://ecourses.iasri.res.in/>

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester VI
Post harvesting management of Horticulture product
Practical I
Course no. BVHSTEC127

Work Load-5

Practical: 5 Lectures/Week/Batch

Credits:04

Practical: 50 Marks

1. Maturity indices of fruits.
2. Maturity indices of vegetables.
3. Maturity indices of flowers.
4. Maturity indices of Spices.
5. Determination of physiological loss in weight and quality.
6. Grading of horticultural produce manual and Mechanical.
7. Post-harvest treatment of horticultural crops, physical and chemical methods.
8. Packaging in fruits, vegetables by using different packaging materials.
9. Packaging in plantation crops and cut flowers by using different packaging materials.
10. Methods of storage.
11. Post-harvest disorders in horticultural produce.
12. Visit to packaging houses, cold storage.
13. Project/Field visit/ Internship/ Field work /Hands on training

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester VI
Food Beverages
Practical II
Course no. BVHSTCC 128

Work Load-5

Practical: Lectures/Week/Batch

Credits:04

Practical: 50 Marks

1. Quality analysis of water from different sources and treatments.
2. Determination of aqueous extraction of tea/coffee.
3. Test for chicory in coffee.
4. Detection of sodium benzoate in beverage.
5. Measurement of pH and acidity of beverage.
6. Detection of *E. coli* in beverage.
7. Measurement of CO₂ content of carbonated beverage.
8. Determination of caffeine in beverages.
9. Determination of tannins in wine.
10. Preparation of RTS beverage.
11. Preparation of carbonated beverage.
12. Specifications for different fruit beverages and preparation of fruits squash.
13. Preparation of artificial lemon juice.
14. Visit to carbonation unit.
15. Visit to mineral water plant .Project/Field visit/ Internship/ Field work /Hands on training

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III
Horticulture Science and Technology
Semester VI
Processing of Horticulture Product
Practical III
Course no. BVHSTCC 129

Work Load-5

Practical: Lectures/Week/Batch

Credits: 04

Practical: 50 Marks

1. Primary processing of selected fruits and vegetables.
2. Canning of mango/guava/ papaya.
3. Preparation of jam/ jelly/ marmalade from selected fruit.
4. Preparation of squash.
5. Preparation of grape raisins.
6. Preparation of dried fig / banana fig.
7. Preparation of fruit candy.
8. Osmotic dehydration of fruit slices.
9. Preparation of fruit toffee.
10. Preparation of dried onion/garlic/ginger.
11. Preparation of banana/ potato wafers.
12. Preparation of dehydrated tomato powder.
13. Visit to fruits and vegetables processing unit.
14. Project/Field visit/ Internship/ Field work /Hands on training.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part –III
Horticulture Science and Technology
Semester VI
Fundamentals of Entomology, pest of fruit, vegetable and flower
Practical IV
Course no. BVHSTCC 130

Work Load-5

Credits:04

Practical: Lectures/Week/Batch

Practical: 50 Marks

1. Pests of Okra and Brinjal.
2. Pests of Tomato, Bell pepper / Capsicum.
3. Pests of Cruciferous and Roost crops.
4. Pests of Cucurbitaceous crops.
5. Pests of Potato, Sweet potato.
7. Pests of Leafy vegetable, Pea, Beans.
8. Pests of Rose, Chrysanthemum, Marigold.
9. Pests of Jasmine, Tuberose, Aster.
10. Pests of Gladiolus, Gerbera, Carnation, Lily, Anthurium & Orchids
11. Pests of Cinnamon, Cardamom, Nutmeg.
12. Pests of Curry leaf, Coriander, Cumin, Fennel, Turmeric & Ginger.
13. Pests of Chilli, Onion and Garlic.
14. Insect-pests of storage & processed vegetable, ornamental and spice crops and their management.
15. Visit to research centre.