

॥ सा विद्या या विमुक्तये ॥



स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

“ज्ञानतीर्थ” परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

“Dnyanteerth”, Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

Phone: (02462) 229542

Website: www.srtmun.ac.in

E-mail: bos.srtmun@gmail.com

Fax : (02462) 229574

विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०-२१ पासून मान्यता दिलेल्या व्होकेशनल कोर्सेसचे (बी.व्होक पदवी, अॅडव्हॉस डिप्लोमा, डिप्लोमा व सर्टिफिकेट) अभ्यासक्रम शैक्षणिक वर्ष २०२०-२१ पासून लागू करणे बाबत.

परिपत्रक

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०-२१ पासून मान्यता दिलेल्या व्होकेशनल कोर्सेसच्या (बी. व्होक पदवी, अॅडव्हॉस डिप्लोमा, डिप्लोमा व सर्टिफिकेट्स) अभ्यासक्रमांना मा विज्ञान व तंत्रज्ञान विद्याशाखेने दिनांक ३१ मे २०२१ रोजीच्या बैठकीतील केलेल्या शिफारशीप्रमाणे व मा. विद्यापरिषदेच्या दिनांक १२ जून २०२१ रोजीच्या बैठकीतील विषय क्रमांक २६/५१-२०२१ च्या ठरावानुसार खालील अभ्यासक्रमांस मान्यता देण्यात आली आहे.

1. B. Voc. IT/Hardware and Networking.
2. B. Voc Software Development.
3. B. Voc. Medical Laboratory Technology.
4. B. Voc. Horticulture and Post-Harvest Technology.
5. B. Voc. Herbal Medicine.
6. B. Voc. Commercial Aquaculture.
7. B. Voc. Food Processing Technology.
8. B. Voc. Skill Based Zoology.
9. B. Voc. Vocational Biotechnology.
10. B. Voc. Plant Tissue Culture Secretary.
11. Advance Diploma Radiological Physics.
12. Diploma – Computer Hardware.
13. Diploma – Computer Network Assistant.
14. Diploma – PGDMLT.
15. Diploma – Embedded System Design.
16. Diploma- Biofertilizer.
17. Diploma- Fisheries and Farm Management.
18. Diploma - Bee Keeping.

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

जा.क्र.:शैक्षणिक-१/परिपत्रक/व्होकेशनल अभ्यासक्रम/N-
२०२०-२१/६८

दिनांक : ०५.०७.२०२१

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
- ५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
- ६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

स्वाक्षरित

सहा कुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED**



स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड.

UGC Sanctioned Vocational Course

Syllabus for

B. Voc. Degree in

Horticulture and Post-Harvest Technology

(CBCS Pattern)

First Year (Semester I & II)

Faculty: Science and Technology

(w.e.f. 2020-21)

Table: Indicating Eligibility, Duration, Total Credits.

Exit Points /Awards	Eligibility	Normal Duration	Skill Component Credits	General Education Credits	Total Credits for Award	NSQF Level	Medium of instruction
B. Voc Degree	12th pass or Diploma in relevant field after 10 th	Six semester	108	72	180	7	English
Advanced Diploma		Four semester	72	48	120	6	
Diploma		Two semester	36	24	60	5	
Certificate		One semester	18	12	30	4	

About the Course:

Government of India, taking note of the requirement for skill development among students launched National Vocational Education Qualification Framework (NVEQF) which was later on assimilated into National Skills Qualifications Framework (NSQF). Various Sector Skill Councils (SSCs) are developing Qualification Packs (QPs), National Occupational Standards (NOSs) and assessment mechanisms in their respective domains, in alignment with the needs of the industry.

In view of this, the UGC implemented the scheme of Community Colleges from 2013-14 in pilot mode on the initiative of the MHRD. Thereafter, realizing the importance and the necessity for developing skills among students, and creating work ready manpower on large scale, the Commission decided to implement the scheme of Community Colleges as one of its independent schemes from the year 2014-15. The Commission also launched another scheme of B.Voc. Degree programme to expand the scope of vocational education and also to provide vertical mobility to the students admitted into Community Colleges for Diploma programmes to a degree programme in the Universities and Colleges. While these two schemes were being implemented, it was also realized that there is a need to give further push to vocational education on a even larger scale. Accordingly, 'Deen Dayal Upadhyay Centres for Knowledge Acquisition and Upgradation of Skilled Human Abilities and Livelihood (KAUSHAL)' was also incorporated. Since all these three provisions serve a common purpose, all these schemes are merged into a single scheme for providing skill based education under National Qualification Framework.

Type of Courses and Awards: There will be full time credit-based modular programmes, wherein banking of credits for skill and general education components shall be permitted so as to enable multiple exit and entry. The multiple entry and exit enables the learner to seek employment after any level of Award and join back as and when feasible to upgrade qualifications / skill competencies either to move higher in the job profile or in the higher educational system. This will also provide the learner an opportunity for vertical mobility to second year of B.Voc degree programme after one year diploma and to third year of B.Voc degree programme after a two year advanced diploma. The students may further move to Masters and Research degree programmes mapped at NSQF Level 8 – 10.

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Aims and Objectives:

The aims and objectives of the scheme of Vocational programme under NSQF are;

- (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 students by means of pre-defined entry and multiple exit points.
 - (iv) To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements.
 - (v) Such diploma graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
 - (vi) To provide vertical mobility to students coming out of 10+2 with vocational subjects and Community Colleges.
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The Objectives of the B.Voc. in Horticulture and Post-Harvest Technology:

- (i) 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.
- (ii) To develop a scientific attitude to make students open minded, critical and curious.
- (iii) To develop an ability to work on their own and to make them fit for the society.
- (iv) To develop skill in field work, experiments, equipment and laboratory use along with collection and interpretation of materials and data.
- (v) To make aware of natural resources and environment and the importance of conserving the same.
- (vi) To develop ability for the application of the acquired knowledge in the relevant fields so as to make our country self-reliant and self-sufficient.

Outcome of the course:

- (i) This program will train and orient the students in the field of Horticulture under the field of Agriculture.
 - (ii) This program will help the students for their career development.
 - (iii) This program shall train and orient the students for horticultural skills and serve as human resource for the industries and other organizations.
 - (iv) The programme also has a strong interdisciplinary component. Emphasis is given on the experimental learning through hands-on laboratory exercises, field trips and assignments.
 - (v) This skill oriented course will provide job opportunities and additional specific skills to the students for self-employability through the development of their own enterprises.
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**Syllabus structure for B. Voc. Degree in
Horticulture and Post-Harvest Technology**

	Paper No.	Course Number	Course Title	Hr/ Week	Type of Course	Credit	Marks		Total
							ESA	CIA	
Sem.I		General Education Component							
	Paper-I	BAAGE -111	Communication Skills	4	GE	4	75	25	100
	Paper-II	BAAGE -112	Basics of Computer	4	GE	4	75	25	100
	Paper-III	BAAGE -113	*Activity based on Paper-I & II	1	GE	1	-	25	25
		Skill Courses							
	Paper-IV	HORT-111	Fundamentals of Horticulture	4	CC	4	75	25	100
	Paper-V	HORT-112	Plant Propagation & Nursery Management	4	CC	4	75	25	100
	Paper-VI	SSAC-111	Fundamentals of soil science	4	CC	4	75	25	100
		Practical Skill Courses							
	Paper-VII	Practical Based on HORT-111		3	PR	3	50	25	75
	Paper-VIII	Practical Based on HORT-112		3	PR	3	50	25	75
	Paper-IX	Practical Based on SSAC-111		3	PR	3	50	25	75
Sem.II	Paper No.	Course Number	Course Title	Hr/ Week	Type of Course	Credits	Marks		Total
		General Education Component							
	Paper-X	BAAGE -124	Personality Development	4	GE	4	75	25	100
	Paper-XI	BAAGE -125	Environmental Study	4	GE	4	75	25	100
	Paper-XII	BAAGE -126	*Activity based on Paper-X & XI	1	GE	1	-	25	25
		Skill Courses							
	Paper-XIII	HORT-123	Tropical & Subtropical Fruit Crops	4	CC	4	75	25	100
	Paper-XIV	HORT-124	Tropical & Subtropical Vegetable Crops	4	CC	4	75	25	100
	Paper-XV	SSAC-122	Soil Fertility & Nutrient Management	4	CC	4	75	25	100
		Practical Skill Courses							
	Paper-XVI	Practical Based on HORT-123		3	PR	3	50	25	75
	Paper-XVII	Practical Based on HORT-124		3	PR	3	50	25	75
	Paper-XVIII	Practical Based on SSAC-122		3	PR	3	50	25	75
	Summer	Compulsory Activity: 2 Months Industrial Training during Summer Vacation							

- Note:** 1. The ESA part of practical and Industrial Project should be completely assessed and evaluated by external examiner.
2. The external examiner should be appointed for practical and industrial training ESA part.
3. *Sign denotes that internal assessment should be based on seminar/Interview skill/expected component of the course.
4. Student should submit the Report based on summer industrial training.
5. For VI semester students can opt Elective-I or Elective-II pattern.
6. Student should submit the certificate of three months industrial training from respective industries.

ESA: End Semester Assessment,

CIA: Continues Internal Assessment,

GE: General Education Component,

CC: Core Skill Courses,

PR: Practical Skill Courses,

CIA of 25 Marks (Theory): 15 Marks for college level internal test & 10 Marks for Assignment,

CIA of 25 Marks (Practical): 15 Marks for college level internal practical test & 10 Marks for Record Book and Field Note Book submission.

Swami Ramanand Teerth Marathwada University, Nanded
Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied
Faculties)

First Year (Semester I)

Paper-I: Communication Skills (BAAGE-111)

Maximum Marks: 100

Credits: 4

Periods: 45

Unit I: Basic Grammar: (13 Periods)

Introduction, Grammar Word Classes (Open & Closed), Sentence – Kinds – Transformation, Phrase, Clause and its kinds, Simple, Complex & Compound sentences, (Only definitions & Structure), Tenses - Use of verbs in the Sentences

Unit II: Vocabulary: (10 Periods)

Morphology, Synonyms & Antonyms, One Word Substitution, Homophones & Homonyms

Unit III: Communication Skills: (10 Periods)

Definition & Types, Communication Cycle & Barriers, Principles for Effective Communication, Varieties in English (Indian, British & American).

Unit IV: Writing Skills: (12 Periods)

Letters (Formal & Informal), Report Writing (Scientific and Formal), Memorandum, Curriculum Vitae, Personal Employment Interview, Group Discussion. Phonetics: 44 sounds, consonants, vowels & Diphthongs, Transcription of words, Accent, Syllable cluster and Intonation.

Reference Books:

1. Developing of Communication Skills -Krishna Mohan & Meera Banerji
 2. A Practical English Grammar A.J. Thomson –Oxford
 3. Mastering English Grammar – S.H.Burton
 4. Technical Communication- Raman Sharma- Oxford
 5. Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
 6. A Course in Phonetics & Spoken English -J.Sethi & P.V.Dhamija
 7. Radiance-Tense
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Swami Ramanand Teerth Marathwada University, Nanded
Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied
Faculties)

First Year (Semester I)

Paper-II Basics of Computer (BAAGE-112)

Maximum Marks: 100

Credits: 4

Periods-45

Unit I: Basics of Computer: (10 Periods)

Introduction to computer, Definition and Types. Basic Applications of Computer; Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software; Connecting keyboard, mouse, monitor and printer to CPU and checking power supply.

Unit II: Computer Operation: (13 Periods)

Operating Computer using GUI Based Operating System: What is an Operating System; Basics of Popular Operating Systems; The User Interface, Using Mouse; Using right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows;

Unit III: MS-Office: (10 Periods)

Introduction to MS-Word: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document. MS- Excel, Power Point. Internet concept & definition, WWW, URL, http, Browsers, Search engines etc.

Unit IV: Computer Networking: (12 Periods)

Basic of Computer networks; LAN, MAN, WAN; Concept of Internet; Applications of Internet. Communications and collaboration: Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.

Reference Books:

1. Introduction of Computer Science- P. Pushman & R. Mata Toledo, McGraw Hill
 2. Computer fundamentals – P.K. Sinha – BPB New Delhi.
 3. Microsoft Office – 2000 Complete – BPB Practicals
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Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester I)

Paper-IV: Fundamentals of Horticulture (HORT-111)

Marks: 100

Credits: 4

Period: 45

Unit-I: Basics of Horticulture: (10 Period)

Introduction to Horticulture, Scope and importance, classification of horticultural crops and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states.

Unit-II: Nursery techniques and management: (12 Period)

Nursery techniques and their management, soil and climate, vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities. Production and practices for fruit, vegetable and floriculture crops.

Unit-III: Pruning and Training of fruit crops: (13 Period)

Introduction, Principles and objectives, types and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management– irrigation methods, merits and demerits, weed management, fertility management in horticultural crops-manures and fertilizers, different methods of application, cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits,

Unit-IV: Classification of fruit bearing trees: (10 Period)

Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness.

Reference Books:

- Chadha, K.L. (ICAR), 2002, 2001. *Handbook of Horticulture*, ICAR, New Delhi
 - D.K. Salunkhe and S.S. Kadam, 2013. *A handbook of Fruit Science and Technology*. CRC Press.
 - Denisen E.L., 1957. *Principles of Horticulture*. Macmillan Publishing Co., New York.
 - Edmond, J.B, Sen, T.L, Andrews, F.S and Halfacre R.G., 1963. *Fundamentals of Horticulture*. Tata McGraw Hill Publishing Co., New Delhi.
 - Gardner/Bardford/Hooker. J.R., 1957. *Fundamentals of Fruit Production*. Mac Graw Hill Book Co., New York.
 - Jitendra Singh, 2002. *Basic Horticulture*. Kalyani Publishers, Hyderabad.
 - K.V.Peter, 2009. *Basics Horticulture*. New India Publishing Agency
 - Kausal Kumar Misra and Rajesh Kumar, 2014. *Fundamentals of Horticulture*. Biotech Books.
 - Kumar, N., 1990. *Introduction to Horticulture*. Rajyalakshmi publications, Nagarcoil, Tamilnadu *e-reading*: <http://ecourses.iasri.res.in/>
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Swami Ramanand Teerth Marathwada University, Nanded
B.Voc Degree Horticulture & Post Harvest Technology
First Year (Semester I)

Paper-V: Plant Propagation & Nursery Management (HORT-112)

Marks: 100

Credits: 4

Period: 45

Unit-I: Propagation: (11 Period)

Introduction to plant propagation, Need and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages. Seed dormancy: types of dormancy (scarification & stratification) internal and external factors.

Unit-II: Nursery techniques and nursery management: (12 Period)

Introduction to Nursery techniques nursery management. Propagation Structures: Mist chamber, humidifiers, greenhouses, glasshouses, cold frames, hot beds, poly-houses, phytotrons nursery (tools and implements). Nursery registration act, Insect/pest/disease control in nursery.

Unit-III: Vegetative Propagation Methods: (12 Period)

Stages of seed germination with examples and vegetative propagation, methods and techniques of division-stolons, pseudobulbs, offsets, runners, cutting, layering, grafting, formation of graft union, factor affecting, healing of graftage and budding physiological & bio chemical basis of rooting, factors influencing rooting of cuttings and layering, graft incompatibility.

Unit-IV: Anatomical studies: (10 Period)

Anatomical studies of bud union, selection and maintenance of mother trees, collection of scion wood stick, scion-stock relationship, and their influences, Techniques of propagation through specialized organs, corm, runners, suckers. Micro-grafting,

Reference Books:

- Chadha, K.L. (ICAR) 2002, 2001. *Hand book of Horticulture*. ICAR, New Delhi.
- Chundawat, B.S. 1990. *Arid fruit culture*. Oxford and IBH, New Delhi.
- Ganner, R.J. and Choudhri, S.A. 1972. *Propagation of Tropical fruit trees*. Oxford and IBN publishing Co., New Delhi.
- Guy W. Adriance and Feed R. Brison. *Propagation of Horticultural Plants*. Axis Books (India).
- Hartman, H.T and Kester, D.E. 1976. *Plant Propagation Principles and practices*. Prentice hall of India Pvt.Ltd., Bombay.

- Hudson T. Hartmann, Dale E. Kester, Fred T. Davies, Jr. and Robert L. Geneve. *Plant Propagation- Principles and Practices(7th Edition)*. PHI Learning Private Limited, New Delhi-110001
- Mukherjee,S.K. and Majumdar,P.K.1973.Propagation of fruit crops. ICAR, New Delhi.
- Sadhu,M.K.1996. *Plant Propagation*. New age International Publishers, New Delhi.
- Sarma,R.R.2002. *Propagation of Horticultural Crops*.Kalyani Publishers,(Principles and practices) New Delhi.
- Symmonds,1996. *Banana*.II edition Longman, London.
- T.K.Bose, S.K.Mitra, M.K.Sadhu, P. Das and D.Sanyal. *Propagation of Tropical & Subtropical Horticultural Crops, Volume 1(3rd Revised edition)*.NayaUdyog, 206, BidhanSarani, Kolkata 700006.

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

Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester I)

Paper-VI: Fundamentals of soil science (SSAC-111)

Marks: 100

Credits: 4

Period: 45

Unit-I: Soil Formation and Classification: (11 Period)

Composition of earth's crust, Soil as natural body- major components. Formation of Soil, soil forming factors. Physical properties: Texture definition, methods of textural analysis, textural classes, use of textural triangle. Absolute Specific gravity/particle density definition, apparent specific gravity/bulk density porosity, factors influencing bulk density. Relation between BD & Porosity.

Unit-II: Soil Characteristics: (11 Period)

Pore space: definition, factors affecting capillary & non- capillary porosity. Soil color: definition, significance, Factors influencing soil color, soil moisture and organic matter. Soil structure: definition, classification. Factors influencing soil structure

Unit-III: Soil and Plant growth: (10 Period)

Soil consistence, plasticity. Soil air: composition, factors influencing soil air, and effect on plant growth. Soil Temperature: Sources, distribution of heat, factors influencing soil temperature and measurement of soil temperature and effect on plant growth.

Unit-IV: Soil chemical properties: (13 Period)

Soil chemical properties: Soil colloids: organic, humus, inorganic. Ion exchange: cation and anion, importance of ion exchange. pH and nutrient availability, soil buffering capacity. Soil organic matter: sources, factors, decomposition and importance. Types of Soil water, measurement of soil water, movement, pF scale. Soil biology: Importance soil microbes, benefits and harmful effects. Problematic Soils –Salt affected soil, Acid soil, Flooded and Coastal saline soil properties. Management of problematic soils.

Suggested Reading:

1. Brady, N. C. 2016. The Nature and Properties of Soils. 15th edition Publisher: Pearson Education, ISBN: 978-0133254488.
 2. **Biswas, T.D.; Mukherjee, S.K.** 1995. Text Book of Soil Science 2nd sEd. Tata McGraw Hill Publisher, Delhi pp 433.
 3. Das D. K. 2011. Introductory Soil Science, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
 4. Jackson, M.L. 1973. Soil Chemical Analysis. Printice Hall, India, Pvt. Ltd. New Delhi. pp 498.
 5. Fundamentals of Soil Science. V. D. Patil
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Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester I)

Paper-VII: Practical Based on Fundamentals of Horticulture (HORT-111)

Marks: 75

Credits: 3

Pr. No.	Practical Title
1	Features of orchard, planning and layout of orchard
2	Identification of tools and implements
3	Layout of nutrition garden.
4	preparation of nursery beds for sowing of vegetable seeds
5	Digging of pits for fruit plants
6	Study of planting systems
7	Training and pruning of orchard trees.
8	Preparation of fertilizer mixtures and field application.
9	Preparation and application of growth regulators (Powder form).
10	Preparation and application of growth regulators (Lanolin Paste)
11	Layout of different irrigation systems.
12	Identification and management of nutritional disorder in fruits.
13	Assessment of bearing habits.
14	Maturity standards of horticultural crops,
15	Study of harvesting and grading of horticultural crops
16	Study of packaging and storage of horticultural crops

Swami Ramanand Teerth Marathwada University, Nanded
B.Voc Degree Horticulture & Post Harvest Technology
First Year (Semester I)

Paper-VIII: Practical Based on Plant Propagation & Nursery Management (HORT-112)

Marks: 75

Credits: 3

Pr. No.	Practical Title
1	Study of different media for plant propagation.
2	Preparation of nursery beds and sowing seeds.
3	Seed treatments for breaking seed dormancy, including germination and growth of seedlings.
4	Raising root stock in various containers.
5	Potting reporting and preparation of plant material for potting.
6	Practicing different types of cutting, layering
7	Practicing different types of runner, offsets and other specialized plant organs for propagation.
8	Practicing different budding method.
9	Practicing different grafting methods.
10	Preparation growth regulators for seed germination and vegetative propagation.
11	Use of mist chamber in plant propagation and hardening of plants.
12	Digging, labeling and packing of nursery plant.
13	Nutrients application and plant protection measures in nursery.
14	Raising, maintenance and cost of different nursery structure.
15	Maintenance of nursery record.
16	Visit to tissue culture laboratory. Visit to established model Govt. and Private Nurseries of adjoining areas

Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester I)

Paper-IX: Practical based on Fundamentals of soil science (SSAC-111)

Marks: 75

Credits: 3

Pr. No	Practical Title
1	Basic analytical concepts, techniques and calculation.
2	Collection and preparation of soil samples for horticultural crops
3	Determination of moisture content in soil by gravimetric method
4	Determination of pH and EC of soil sample
5	Determination of calcium carbonate by Rapid Titration method
6	Determination of Organic carbon by Walkely and Black method
7	Determination of Bulk density and porosity of soil
8	Textural analysis of soil by Boucouyos hydrometer method
9	Determination of available nitrogen content in soil
10	Determination of available Phosphorus from soil
11	Determination of available Potassium from soil
12	Determination of available sulphur from soil
13	Determination of DTPA extractable micronutrient from soil
14	Description of soil profile in field
15	Determination of soil colour using Munsell colour chart, Estimation of water holding capacity, Field capacity, Permanent wilting point and
16	Determination of soil water potential characteristic curve by tensiometer and pressure plate apparatus. Visit to Soil and Water Clinic

Swami Ramanand Teerth Marathwada University, Nanded

**Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied
Faculties)**

First Year (Semester II)

Paper-X: Personality Development (BAAGE-124)

Maximum Marks: 100

Credits: 4

Periods: 45

UNIT-I: Personality Development: (Periods: 11)

Introduction to personality development: The concept personality- Dimensions of theories of Freud & Erickson- personality – significant of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success, What is failure - Causes of failure. SWOT analyses.

UNIT-II: Attitude & motivation: (Periods:11)

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude - Advantages –Negative attitude - Disadvantages - Ways to develop positive attitude - Difference between personalities having positive and negative attitude. Concept of motivation - Significance - Internal and external motives - Importance of self-motivation- Factors leading to demotivation

UNIT-III: Interpersonal Relationship: (Periods: 11)

Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self-esteem - Positive and negative self-esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviors - Lateral thinking.

UNIT-IV: Overall personality development: (Periods: 12)

Other aspects of personality development: Body language, Problem-solving, Conflict and Stress Management, Decision making skills, Leadership and qualities of a successful leader. Character building, Team-work, Time management, Work ethics, Good manners and etiquette. Employability quotient: Resume building, The art of participating in Group Discussion. Facing the Personal (HR & Technical) Interview.

Reference Books:

1. "Personality Development and Soft Skills" by Barun Mitra
 2. The Only Skill That Matters by Jonathan A. Levi
 3. "Personality Development" by Swami Vivekananda
 4. "Personality Development for Students" by Dr Vijay Agrawal
 5. Soft Skills Personality Development for Life Success- 2nd Edition by Prashant Sharma
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Swami Ramanand Teerth Marathwada University, Nanded
Certificate, Diploma, Advanced Diploma and B. Voc. Degree (Agriculture and Allied
Faculties)

First Year (Semester II)

Paper-XI: Environmental Study (BAAGE-125)

Maximum Marks: 100

Credits: 4

Periods: 45

Unit-I: Ecosystems: (Periods: 11)

Introduction, Concept of an ecosystem. Structure and function of an ecosystem. Energy flow in the ecosystem. Food chains, food webs. Ecological pyramids: Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Aquatic ecosystems (ponds)

Unit-II: Biodiversity: (Periods: 11)

Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega diversity nation. biodiversity Hot-spots of India. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-III: Environmental Biology: (Periods: 12)

Environmental Pollution; Introduction, Definition, Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Noise pollution f. Thermal pollution g. nuclear hazards. Disaster Management; Natural disaster- Earthquake, Tsunami, Cyclone, Tornado, Chemical Disaster- Bhopal Gas Tragedy, Nuclear Disaster- Chernobil.

Unit-IV: Natural Resources: (Periods: 11)

Renewable and Nonrenewable Resources; Solar Energy, Wind Energy. Forest Resources, Metal Mines, Crude Oil Mines. Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. Environmental ethics. Population growth, Population explosion.

REFERENCES:

1. Agarwal, K.C.2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad — 380 013, India, Email: mapin@icenet.net (R)

3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.480p
 4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
 5. Cunningham, W. P. Cooper, T. H. Gorhani, E & Hepworth, M.T.2001. Environmental Encyclopedia, Jaico Publ. House. Mumbai, 1196p
 6. Dc A.K., Environmental Chemistry, Wiley Eastern Ltd.
 7. Down to Earth, Centre for Science and Environment(R)
 8. Gleick, 11.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press. 473p
 9. Hawkins R.E, Encyclopedia of Indian Natural History, Bombay Natural History Society , Bombay (R)
 10. Heywood, VII & Watson, R.I. 1995 . Global Biodiversity Assessment. Cambridge Univ. Press 1140p. .
 11. Jadhav & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
 12. Mckinnv, M.L. & Schoch. R.M. 1996. Environmental Science systems & Solutions. Web enhanced edition. 639p.
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Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester II)

Paper-XIII: Tropical & Subtropical Fruit Crops (HORT-123)

Marks: 100

Credits: 4

Periods: 45

Unit-I: Introduction to Tropical & Subtropical Fruit Crops: (11 Periods)

Horticultural classification of fruits including genome classification. Horticultural zones of India, detailed study of area, production and export potential, varieties, climate and soil requirements, propagation techniques, planting density and systems, after care, training and pruning.

Unit-II: Intercultural Operations: (12 Periods)

Management of water, nutrient and weeds, special horticultural techniques including plant growth regulators, their solution preparation and use in commercial orchards. Post-harvest technology, harvest indices, harvesting methods, grading, packaging and storage of the following crops. Mango, banana, grapes, citrus, papaya, sapota, guava, pomegranate,

Unit-III: Production Management:(11 Periods)

Bearing in mango and citrus, causes and control measures of special production problems, alternate and irregular bearing overcome, control measures.

Unit-IV: Plant Diseases: (11 Periods)

Seediness and kokan disease in banana, citrus decline and casual factors and their management. Bud forecasting in grapes, sex expression and seed production in papaya, latex extraction and crude papain production, economic of production.

Text Books:

- T.K.Chattopadhyay, 1997. *Text book on pomology*. Kalyani Publishers, New Delhi. udyog-Kolkata

Reference Books:

- Bose, T.K., Mitra, S.K. and Sanyal, D., 2002. *Tropical and Sub-Tropical-Vol-I*. Naya
- Chadha, K.L. (ICAR) 2002, 2001. *Hand book of Horticulture*. ICAR, New Delhi.
- Chundawat, B.S., 1990. *Arid fruit culture*. Oxford and IBH, New Delhi.
- F.S. Davies and L.G. Albrigo, 2001. *Citrus*, Cab International.
- H.P. Singh and M.M. Mustafa, 2009. *Banana-new innovations*. Westville Publishing House, New Delhi.

- K.L.Chadda, 2009. *Advanced in Horticulture*. Malhotra Publishing House, New Delhi.
- M.S.Ladaniya, 2013. *Citrus Fruits*. Elsevier, India post ltd, New Delhi
- R.E.Litz, 2009. *The Mango* 2nd Edn. Cabi Publishing, Willingford, U.K.
- Radha T and Mathew L., 2007. *Fruit crops*. New India Publishing Agency.
- Rajput, CBS and Srihari babu, R., 1985. *Citriculture*. Kalyani Publishers, New Delhi.
- S.P. Singh, 2004. *Commercial fruits*. Kalyani Publishers, New Delhi.
- Symmonds, 1996. *Banana*. II Edn. Longman, London.
- W.S. Dhillon, 2013. *Fruit Productionin India*. Narendra Publishing House.

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

Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester II)

Paper-XIV: Tropical & Subtropical Vegetable Crops (HORT-124)

Marks: 100

Credits: 4

Periods: 45

Unit-I: Introduction to Tropical & Subtropical Vegetable Crops: (10 Periods)

Area, production, economic importance, scope and export potential of tropical and subtropical vegetable crops. Types of Vegetable Farming, Classification of vegetables.

Unit-II: Vegetable Cultivation Practices: (13 Periods)

Description of varieties and hybrid, climate and soil requirements, seed rate, preparation of field, nursery practices; transplanting of vegetable crops and planting for directly sown/transplanted vegetable crops. Spacing, planting systems water and weed management; nutrient management and deficiencies, use of chemicals and growth regulators.

Unit-III: Cropping systems: (12 Periods)

Cropping systems, harvest, yield, post-harvest handling, economics and marketing of vegetable crops such as tomato, brinjal, chillies, capsicum, okra, amaranthus, cluster beans, cowpea, lab-lab, snap bean.

Unit-IV: Cropping systems: (10 Periods)

Cropping systems, harvest, yield, post-harvest handling, economics and marketing of vegetable crops such as Cucurbits, moringa, curry leaf, agathi, portulaca, basella, sorrel and roselle.

Text book:

- B.R.Choudhary, 2009. *A Text book on production technology of vegetables*. Kalyani Publishers. Ludhiana.
- S. Thamburaj, 2014. *Text book of vegetable, tuber crops and Spices*. ICAR, New Delhi

Reference Books:

- Choudhury, B. (ICAR). 1990. *Vegetables*. 8th edition, National Book Trust, New Delhi.
- Haldavnekar, P.C.; Parulekar, Y.R.; Mali, P.C. and Haldankar, P.M, 2015. *Vegetables – Production Technology*, Astral International.
- K S Yawalkar, 2008. *Vegetable crops in India*. Agri-Horticultural Pub. House. Nagpur. 2004

- K.L.Chadha, 1993. *Advances in Horticulture*. Malhotra publishing house. New Delhi
 - K.V.Kamath, 2007. *Vegetable Crop Production*. Oxford Book Company. Jaipur
 - M.K.Rana, 2008. *Olericulture in India*. Kalyani Publishers. Ludhiana
 - M.S.Dhaliwal, 2008. *Handbook of Vegetable Crops*. Kalyani Publishers. Ludhiana
 - Nath Prem, 1994. *Vegetables for the Tropical Regions*. ICAR New Delhi
 - P.Hazra, 2011. *Modern Technology in Vegetable Production*. New India Publishing Agency. New Delhi.
 - Pratibha Sharma, 2007. *Vegetable : Disease Diagnosis and Biomanagement*. Avishkar Publishers. Jaipur
 - Singh, Umashankar, 2008. *Indian Vegetables*. Anmol Publications. Pvt.Ltd .New Delhi.
 - T.K.Bose, 2002. *Vegetable Crops*. Nayaprakash. Kolkata
 - T.R.Gopal Krishnan, 2007. *Vegetable Crops*. New India Publishing Agency. New Delhi. *e-reading:* <http://ecourses.iasri.res.in/>
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Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester II)

Paper-XV: Soil Fertility & Nutrient Management (SSAC-122)

Marks: 100

Credits: 4

Periods: 45

Unit-I: Soil fertility and soil productivity: (10 Periods)

Introduction to Soil fertility and soil productivity: factors Essential nutrient elements and functions, deficiency symptoms. Mechanism of Nutrient transport / uptake to plants and nutrient availability. Acid calcareous and salt affected soil characteristics and management.

Unit-II: Integrated plant nutrient management: (13 Periods)

Role of micro-organisms in organic matter decomposition and humus formation, importance of C:N ratio and pH in plant nutrition soil buffering capacity. Integrated plant nutrient management. Soil fertility evaluation methods: chemical, biological and by visual symptoms, critical levels of different nutrients and hidden hunger in soil. DRIS Approach, critical limit approach.

Unit-III: Manures and fertilizer: (12 Periods)

Manures and fertilizer classification and manufacturing process. Properties and fate of major and micronutrient in soils. NPK fertilizers: composition and application methodology, luxury consumption, nutrient reactions, deficiency symptom by visual diagnosis. Secondary & Micronutrient fertilizers their types, composition, reaction in soil and effect on crop growth.

Unit-IV: Fertilizer control order: (10 Periods)

Fertilizer control order, Plant nutrient toxicity symptoms and remedial measures. Soil test crop response and targeted yield concept. Biofertilizers: importance, types and use in horticultural crop. Nutrients use efficiency (NUE) and management. Effect of potential toxic elements in soil and plant.

Suggested Reading:

1. Yawalkar K.S, Agarwal J. P. and Bokkde, 1992. Manures and Fertilizers. Agri. Horticultural Publishing House, Nagpur.
 2. Tandan HLS, 1994. Fertilizers Guide. Fertilizers Development Consultation Organizations, New Delhi.
 3. Mengel , et al., 2001. Principles of Plant Nutrition (5th Edition), Springer
 4. Seethramaan, S. Biswas, B.C. Maheshwari, S. and Yadav, D.S. 1986
 5. Hand Book on Fertilizers Technology. The Fertilizers Association of India, New Delhi.
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Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester II)

Paper-XVI: Practical Based on Tropical & Subtropical Fruit Crops (HORT-123)

Marks: 75

Credits: 3

Pr. No.	Practical Title
1	Description and identification of varieties based on flower and fruit morphology in tropical crops.
2	Description and identification of varieties based on flower and fruit morphology in subtropical crops.
3	Training and pruning of grapes, mango, guava and citrus.
4	Selection of site and planting system
5	Pre-treatment of banana suckers, desuckering in banana
6	Sex forms in papaya, seed production in papaya, latex extraction and preparation of crude papain
7	Use of plastics in fruit production
8	Visit to commercial orchards and diagnosis of maladies
9	Manure and fertilizer application including bio-fertilizer in fruit crops
10	Preparation and application of growth regulators in banana, grapes and mango.
11	Ripening of fruits
12	Grading and packaging,
13	Production economics for tropical and sub-tropical fruits.
14	Mapping of arid and semi-arid zones of India.
15	Botanical description and identification of ber, fig, jamun, pomegranate, carissa, phalsa
16	Botanical description and identification of wood apple, West Indian cherry, tamarind, aonla, bael and annona

Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester II)

Paper-XVII: Practical based on Tropical & Subtropical Vegetable Crops (HORT-124)

Marks: 75

Credits: 3

Pr. No.	Practical Title
1	Identification of tropical vegetable crops
2	Identification of subtropical vegetable crops
3	Raising vegetable seedlings of improved varieties
5	Field preparation and lay out for vegetable crops
6	Seed treatment and sowing of vegetable crops.
7	Planting and transplanting of vegetable crops
8	Integrated weed management in veg crops.
9	Methods of irrigation and manuring
10	Use of plant growth regulators in veg. production.
11	Identification of nutritional deficiencies in veg. crops and remedies.
12	Identification of physiological disorders in veg. crops.
13	Harvesting indices and maturity standards.
14	Harvesting of vegetables.
15	Packaging and storage of vegetable crops.
16	Project preparation and cost of cultivation of any two vegetables.

Swami Ramanand Teerth Marathwada University, Nanded

B.Voc Degree Horticulture & Post Harvest Technology

First Year (Semester II)

Paper-XVIII: Practical based on Soil Fertility & Nutrient Management (SSAC-122)

Marks: 75

Credits: 3

Pr. No	Practical Title
1	Determination of organic matter from compost / FYM /oil cake (Ignition method)
2	Determination of soil available nitrogen (Subbiah and Asija,, 1956)
3	Determination of available phosphorus in soil (Olsen et al, 1954) for alkaline soils.
4	Determination of soil available potassium in soil
5	Determination of soil available sulphur in soil.
6	Determination of exchangeable Calcium and Magnesium in soil
7	Determination of exchangeable Calcium and Magnesium by Versenate (EDTA) Method.
8	Determination of soil Micronutrients
9	Determination of Lime requirement of Problem soils Determination of Lime requirement of acid soils (SMP buffer method) (for soils of pH less than 6) To estimate the Lime requirement of a soil (Hutchinson and MacLenan procedure)
10	Fertilizer Adulteration test / Identification of Adulteration in fertilizer / Detection of adulteration in fertilizers (Rapid test)
11	Determination of total nitrogen from FYM / Compost / oilseed cake and C : N ratio (By Kjeldahl method)
12	Determination of total phosphorus and potassium from compost / FYM.
13	Determination of (Amide nitrogen) from urea.
14	Determination of ammonical nitrogen content of ammonium sulphate. Determination of water soluble phosphorus in superphosphate (Pumberton method)
15	Determination of total potassium content of muriate of potash (by flame photometer). And zinc in zinc sulphate.
16	Use of soil testing kit and Use of leaf colour chart for nutrient deficiency diagnosis

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based Credit System (CBCS) (Semester Pattern)

Theory Examination

Question Paper Pattern (B.Voc.)

Maximum Marks: 75

Time: 3.00 Hrs

Q1. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q2. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q3. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q4. Long Answer Type Question(15 Marks).

OR

(a) Short Answer Type Question(8 Marks)

(b) Short Answer Type Question(7 Marks).

Q5. Write a short note on (**Any three** of following); (15 Marks)

(a)(5 Marks)

(b)(5 Marks)

(c)(5 Marks)

(d)(5 Marks)

(e)(5 Marks).

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based Credit System (CBCS) (Semester Pattern)

Practical Examination

Question Paper Pattern (B.Voc.)

Maximum Marks: 50

Time: 4.00 Hrs

Q1. Perform the Major Experiment(20 Marks).

Q2. (a) Perform the Minor Experiment(10 Marks).

(b) Describe procedure and working of the Minor Experiment(10 Marks).

Q3. (a) Viva -voce(5 Marks).

(b) Submission of Field Collection and Samplings during Field Visits
and Excursions.(5 Marks).
