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LEARNING OUTCOME

BASED

VOCATIONAL

CURRICULUM

JOB ROLE: Tuber Crop Cultivator

(QUALIFICATION PACK: Ref. Id. AGR/Q0403)

SECTOR: Agriculture

Classes 11and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL

EDUCATION

(a constituent unit of NCERT, under MHRD, Government of India

Shyamla Hills, Bhopal- 462 002, M.P., India

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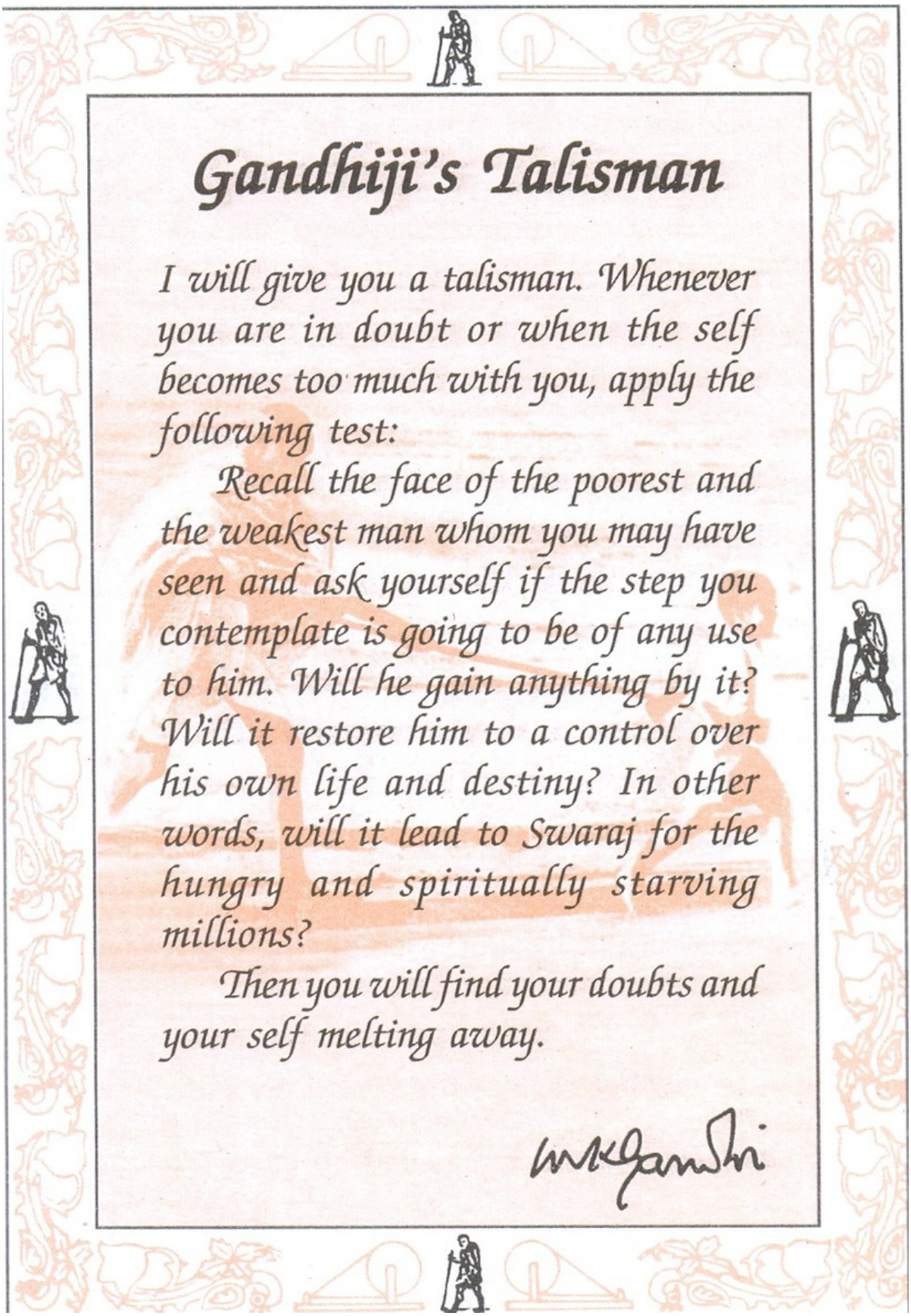

Gandhiji's Talisman

I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, apply the following test:

Recall the face of the poorest and the weakest man whom you may have seen and ask yourself if the step you contemplate is going to be of any use to him. Will he gain anything by it? Will it restore him to a control over his own life and destiny? In other words, will it lead to Swaraj for the hungry and spiritually starving millions?

Then you will find your doubts and your self melting away.

M K Gandhi

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LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

Agriculture- Tuber Crop Cultivator

June, 2017

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of PSS Central Institute of Vocational Education,

FOREWORD

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE) a constituent of the National Council of Educational Research and Training (NCERT) is spearheading the efforts of developing learning outcome based curricula and courseware aimed at integrating both vocational and general qualifications to open pathways of career progression for students. It is a part of Central y Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education (CSSVSHSE) launched by the Ministry of Human Resource Development, Government of India in 2012. The PSS

Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *Rashtriya Madhyamik Shiksha Abhiyan* (RMSA). The main purpose of the learning outcome based curricula is to bring about the improvement in teaching-learning process and working competences through learning outcomes embedded in the vocational subject.

It is a matter of great pleasure to introduce this learning outcome based curriculum as part of the vocational training packages for the job role of Tuber Crop Cultivator. The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skil Qualification Framework (NSQF).

The curriculum aims to provide children with employability and vocational skil s to support occupational mobility and lifelong

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learning. It will help them to acquire specific occupational skil s that meet employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

The curriculum has been developed and reviewed by a group of experts and their contributions are greatly acknowledged. The utility of the curriculum will be adjudged by the qualitative improvement that it brings about in teaching-learning. The feedback and suggestions on the content by the teachers and other stakeholders wil be of immense value to us in bringing about further improvement in this document.

Hrushikesh Senapaty

Director

National Council of Education Research and Training

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth are immense and the possibilities are equal y exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India wil largely depend upon its young workforce. The much-discussed demographic dividend wil bring sustaining benefits only if this young workforce is skil ed and its potential is channelized in the right direction.

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In order to fulfil the growing aspirations of our youth and the demand of skil ed human resource, the Ministry of Human Resource Development (MHRD), Government of India introduced the revised Central y Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education that aims to provide for the diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skil ed manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted the responsibility to develop learning outcome based curricula, student workbooks, teacher handbooks and e-learning materials for the job roles in various sectors, with growth potential for employment.

The PSSCIVE firmly believes that the vocationalisation of education in the nation need to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skil demands of the industry.

The curriculum, therefore, aims at developing the desired professional, managerial and communication skil s to fulfil the needs of the society and the world of work. In order to honour its commitment to the nation, the PSSCIVE has initiated the work on developing learning outcome based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and

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teachers. The expert group through a series of consultations, working group meetings and use of reference materials develops a National Curriculum. Currently, the Institute is working on developing curricula and courseware for over 100 job roles in various sectors.

We extend our gratitude to al the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of curriculum. We are grateful to MHRD and NCERT for the financial support and cooperation in realising the objective of providing learning outcome based curricula and courseware to the States and other stakeholders under the PAB (Project Approval Board) approved project of *Rashtriya Madhyamik Shiskha Abhiyan* (RMSA) of MHRD.

(ii)

Final y, for transforming the proposed curriculum design into a vibrant reality of implementation, al the institutions involved in the delivery system shal have to come together with a firm commitment and they should secure optimal community support. The success of this curriculum depends upon its effective implementation and it is expected that the managers of vocational education and training system, including subject teachers wil make efforts to create better facilities, develop linkages with the world of work and foster a conducive environment as per the content of the curriculum document.

The PSSCIVE, Bhopal remains committed in bringing about reforms in the vocational education and training system through the learner-centric curricula and courseware. We hope that this document wil

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prove useful in turning out more competent Indian workforce for the 21st Century.

RAJESH P. KHAMBAYAT

Joint Director

PSS Central Institute of Vocational Education

ACKNOWLEDGEMENTS

On behalf of the team at the PSS Central Institute of Vocational Education (PSSCIVE) we are grateful to the members of the Project Approval Board (PAB) *of Rashtriya Madhyamik Shiksha Abhiyan* (RMSA) and the officials of the Ministry of Human Resource Development (MHRD), Government of India for the financial support to the project for development of curricula.

We are grateful to the Director, NCERT for his support and guidance. We also acknowledge the contributions of our col eagues at the Technical Support Group of RMSA, MHRD, RMSA Cel at the National Council of Educational Research and Training (NCERT), National Skil Development Agency (NSDA) and National Skil Development Corporation (NSDC) and Agriculture Skil Council of India (ASCI) for their academic support and cooperation.

We are grateful to the contributors for their earnest efforts and contributions in the development of this learning outcome based curriculum. Their names are acknowledged in the list of contributors. The contributions of the course coordinator Uadal Singh and the reviewer R. Elanchezhian, Principal Scientist ICAR-Indian Institute of

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Soil Science, Nabi Bagh, Bairasia Road, Bhopal are thankful y acknowledged.

The contributions made by Vinay Swarup Mehrotra, Professor and Head, Curriculum Development and Evaluation Centre (CDEC),Vipin Kumar Jain, Associate Professor and Head, Programme Planning and Monitoring Cel (PPMC) and Dipak Shudhalwar, Associate Professor, Department of Engineering & Technology, PSSCIVE in development of the curriculum for the employability skil s are duly acknowledged.

Special thanks are due to Sunil Prajapati, Consultant, Horticulture, Department of Agriculture & Animal Husbandry, PSSCIVE, Bhopal, for contribution in drafting and editing the document and bringing it in its present form.

PSSCIVE Team

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1. COURSE OVERVIEW

COURSE TITLE: Agriculture – Tuber Crop Cultivator

A Tuber Crop Cultivator is responsible for cultivating tuber crop on a given piece of land. The responsibilities include from procurement of

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seed to marketing of farm produce in the market.

The job of the Tuber Crop Cultivator involves cultivation of tuber crop as per the package of practices recommended for a particular agronomic climate zone, type of soil, rainfal pattern and climatic condition to achieve the yield as per the genetic potential of given variety and sel the produce as per the competitive market prices without distress sale.

The job requires the individual to have the Ability to work independently, bearing risks and must have ability to work hard and take decisions pertaining to his area of work. The individual should be result oriented and should be responsible for his / her own learning and working. Individual should be able to comprehends basic arithmetic and algebraic principle. Should be able to asses and analyze various opportunities & threats pertaining to climatic and market conditions

COURSE OUTCOMES: On completion of the course, students should be able to:

- Communicate effectively with the customers;
- Identify the principal components of a computer system
- Identify and control hazards in the workplace that pose a danger or threat to their
- Understand Seed selection & seedling production
- Demonstrate Soil preparation and transplanting in Tuber crops
- Understand Soil nutrient management in vegetable crops
- Demonstrate Weed control and management in vegetable crops

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- Demonstrate pest and disease management in vegetable crops
- Management in vegetable crops
- Understand Harvest and post harvest management in Tuber crop

COURSE REQUIREMENTS: The learner should have the basic knowledge of science.

COURSE LEVEL: This is an advance level course. The Tuber crop cultivator course can be opt by a student who completed the job role of Solanaceous crop cultivator in Class IX and Class X.

COURSE DURATION: 600 hrs

Class11 : 300 hrs

Class 12 : 300 hrs

Total : 600 hrs

---

2. SCHEME OF UNITS

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Class 11 and 12 opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Class 11 is as fol ows:

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CLASS 11			
Units		No. of Hours for Theory and Practical 300	Max. Marks for Theory and Practical 100
Part A	**Employability Skills**		
	Unit 1: Communication Skills-III	25	10
	Unit 2: Self-management Skills-III	25	
	Unit 3: Information and Communication Technology Skills-III	20	
	Unit 4: Entrepreneurial Skills-III	25	
	Unit 5: Green Skills-III	15	
		110	**10**
Part B	**Vocational Skills**		
	Unit 1: Introduction to Vegetable Crops	40	40
	Unit 2: Seed preparation for Tuber crop cultivation	50	
	Unit 3: Soil preparation and planting of Tuber crop	40	
	Unit 4: Nutrient management in vegetable crops	35	
		165	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
		10	**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio	10	10
	Viva Voce	05	05
		15	**15**
	Total	**300**	**100**

The unit-wise distribution of hours and marks for Class 12 is as follows:

CLASS 12

3. TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the

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occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

Classroom activities are an integral part of this course and interactive lecture sessions, fol owed by discussions should be conducted by trained vocational teachers. Vocational teachers should make effective use of a variety of instructional aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skil s and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

FIELD VISITS/ EDUCATIONAL TOUR

In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematic col ection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for

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field visits within a short distance from the school and make necessary arrangements for the visits.

At least three field visits should be conducted in a year.

4. ASSISMENT AND CERTIFICATION

Upon successful completion of the course by the candidate, the Central/ State Examination Board for Secondary Education and the respective Sector Skil Council wil certify the competencies.

The National Skil s Qualifications Framework (NSQF) is based on outcomes referenced to the National Occupation Standards (NOSs), rather than inputs. The NSQF level descriptors, which are the learning outcomes for each level, include the process, professional knowledge, professional skil s, core skil s and responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skil s needed to perform a particular job and that the learning programme undertaken has delivered education at a given standard. It should be closely linked to certification so that the individual and the employer could come to know the competencies acquired through the vocational subject or course. The assessment should be reliable, valid, flexible, convenient, cost effective and above al it should be fair and transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one comprising of internal assessment and second an external

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examination, including theory examination to be conducted by the Board. The assessment tools shal contain components for testing the knowledge and application of knowledge.

The knowledge test can be objective paper based test or short structured questions based on the content of the curriculum.

WRITTEN TEST

It al ows candidates to demonstrate that they have the knowledge and understanding of a given topic.

Theory question paper for the vocational subject should be prepared by the subject experts comprising group of experts of academicians, experts from existing vocational subject experts/teachers, subject experts from university/col eges or industry. The respective Sector Skil Council should be consulted by the Central/State Board for preparing the panel of experts for question paper setting and conducting the examinations.

The blue print for the question paper may be as fol ows:

		No. of Questions			
	Typology of Question	Very Short Answer (1 mark)	Short Answer (2 Marks)	Long Answer (3 Marks)	Marks
1.	Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	3	2	2	13
2.	Understanding – (Comprehension – to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	2	3	2	14
3.	Application – (Use abstract information in concrete situation, to apply knowledge to new situations: Use given content to interpret a situation, private an example, or solve a problem)	0	2	1	07
4.	High Order Thinking Skills – (Analysis & Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources)	0	2	0	04
5.	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	0	1	0	02
	Total	5x1=5	10x2=20	5x3=15	40

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SKILL ASSESSMENT (PRACTICAL)

Assessment of skil s by the students should be done by the assessors/examiners on the basis of practical demonstration of skil s by the candidate, using a competency checklist. The competency checklist should be developed as per the National Occupation Standards (NOSs) given in the Qualification Pack for the Job Role to bring about necessary consistency in the quality of assessment across different sectors and Institutions. The student has to demonstrate competency against the performance criteria defined in the National Occupation Standards and the assessment wil indicate that they are 'competent', or are 'not yet competent'. The assessors assessing the skil s of the students should possess a current experience in the industry and should have undergone an effective training in assessment principles and practices. The Sector Skil Councils should ensure that the assessors are provided with the training on the assessment of competencies.

Practical examination al ows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators – the subject teacher and the expert from the relevant industry certified by the Board or concerned Sector Skil Council. The same team of examiners wil conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skil s on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should

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be discussed in the class and the teacher should periodical y monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised as part of the project work. Field visits can be fol owed by a smal -group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence.

Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce al ows candidates to demonstrate communication skil s and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the vocational subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

5. UNIT CONTENTS

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CLASS 11

Part A: Employability Skills

Sino.	Units	Duration (Hrs)
1.	Communication Skills-III	25
2.	Self-management Skills-III	25
3.	Information and Communication Technology Skills-III	20
4.	Entrepreneurial Skills-III	25
5.	Green Skills-III	15
	Total	110

Unit 1: Communication Skill – III			
Learning Outcome	Theory	Practical	Duration
	(10 hrs)	(15 hrs)	(25 Hrs)
1. Demonstrate knowledge of various methods of communication	1. Methods of communication - Verbal - Non-verbal - Visual	1. Writing pros and cons of written, verbal and non-verbal communication 2. Listing do's and don'ts for avoiding common body language mistakes	05
1. Identify specific communication styles	1. Communication styles- assertive, aggressive, passive-aggressive, submissive, etc.	1. Observing and sharing communication styles of friends, teachers and family members and adapting the best practices 2. Role plays on communication styles.	10
3. Demonstrate basic writing skills	1. Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	1. Demonstration and practice of writing sentences and paragraphs on topics related to the subject	10

Unit 2: Self-management Skills – III			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Demonstrate impressive appearance and grooming	1. Describe the importance of dressing appropriately, looking decent and positive body language 2. Describe the term grooming 3. Prepare a personal grooming checklist 4. Describe the techniques of self- exploration	1. Demonstration of impressive appearance and groomed personality 2. Demonstration of the ability to self- explore	10
2. Demonstrate team work skills	1. Describe the important factors that influence in team building 2. Describe factors influencing team work	1. Group discussion on qualities of a good team 2. Group discussion on strategies that are adopted for team building and team work	10

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3. Apply time management strategies and techniques	1, Meaning and importance of time management – setting and prioritizing goals, creating a schedule, making lists of tasks, balancing work and leisure, using different optimization tools to break large tasks into smaller tasks.	1. Game on time management 2. Checklist preparation 3. To-do-list preparation	**05**

Unit 3: Information and Communication Technology Skills - III			
Learning Outcome	**Theory (08 hrs)**	**Practical (12 hrs)**	**Duration (20 Hrs)**
1. Create a document on word processor	1. Introduction to word processing. 2. Software packages for word processing. 3. Opening and exiting the word processor. 4. Creating a document	1. Demonstration and practice of the following: • Listing the features of word processing • Listing the software packages for word processing • Opening and exit the word processor • Creating a document	**10**
2. Edit, save and print a document in word processor	1. Editing text 2. Wrapping and aligning the text 3. Font size, type and face. 4. Header and Footer 5. Auto correct 6. Numbering and bullet 7. Creating table 8. Find and replace 9. Page numbering. 10. Printing document. 11. Saving a document in various formats.	1. Demonstration and practising the following: • Editing the text • Word wrapping and alignment • Changing font type, size and face • Inserting header and footer • Removing header and footer 1. Using autocorrect option 2. Insert page numbers and bullet 3. Save and print a document	**10**

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Unit 4: Entrepreneurial Skills - III			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Describe the significance of entrepreneurial values and attitude	1. Values in general and entrepreneurial values 2. Entrepreneurial value orientation with respect to innovativeness, independence, outstanding performance and respect for work	1. Listing of entrepreneurial values by the students. 2. Group work on identification of entrepreneurial values and their roles after listing or reading 2-3 stories of successful entrepreneur 3. Exhibiting entrepreneurial values in Ice breaking, rapport building, group work and home assignments	**10**
2. Demonstrate the knowledge of attitudinal changes required to become an entrepreneur	1. Attitudes in general and entrepreneurial attitudes 2. Using imagination/ intuition 3. Tendency to take moderate risk 4. Enjoying freedom of expression and action 5. Looking for economic opportunities 6. Believing that we can change the environment 7. Analyzing situation and planning action 8. Involving in activity	1. Preparing a list of factors that influence attitude in general and entrepreneurial attitude 2. Demonstrating and identifying own entrepreneurial attitudes during the following micro lab activities like thematic appreciation test 3. Preparing a short write-up on "who am I" 4. Take up a product and suggest how its features can be improved 5. Group activity for suggesting brand names, names of enterprises, etc.	**15**

Unit 5: Green Skills - III			
Learning Outcome	**Theory (07 hrs)**	**Practical (08 hrs)**	**Duration (15 Hrs)**
1. Describe importance of main sector of green economy	1. Main sectors of green economy- E-waste management, green transportation, renewal energy, green construction, water management 2. Policy initiatives for greening economy in India	1. Preparing a poster on any one of the sectors of green economy 2. Writing a two-page essay on important initiatives taken in India for promoting green economy	**08**

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2. Describe the major green Sectors/Areas and the role of various stakeholder in green economy	1. Stakeholders in green economy 2. Role of government and private agencies in greening cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries	1. Preparing posters on green Sectors/Areas: cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries	**07**
Total	**45**	**65**	**110**

Part B: Vocational Skills

Sino.	Units	Duration (Hrs)
1.	Introduction to Vegetable Crops	40
2.	Seed preparation for Tuber crop cultivation	50
3.	Soil preparation and planting of Tuber crop	40
4.	Nutrient management in vegetable crops	35
	Total	**165**

Unit 1: Introduction to Vegetable Crops			
Learning Outcome	**Theory (16 hrs)**	**Practical (24 hrs)**	**Duration (40 Hrs)**
1. Describe olericulture and importance of vegetable in human diet	1. Define olericulture 2. Describe importance of vegetable in human diet	1. Demonstrate the availability of nutrients through vegetables using charts/pictures	**05**
2. Memorize present status and scope of vegetable cultivation	1. Area and production of major vegetables in India 2. Major vegetables producing states in India 3. Future possibilities of vegetable	1. Enlist the major states producing vegetable crops 2. Enlist the major Vegetable crops in India	**05**
3. Classify and distribution of Vegetable crops	1. Different types of vegetable classification. 2. Classify the vegetable on basis of season and edible plant parts	1. Depict the different types of vegetable classification on chart	**05**
4. Describe production practices of important vegetable crops, Tomato, potato, cauliflower, radish and bottle-guard	1. Package of practices for the given vegetables in light of-climate, varieties, planting time and method, seed rate and	1. Demonstrate the method of planting in given vegetable	**25**

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Unit 1: Introduction to Vegetable Crops			
Learning Outcome	**Theory (16 hrs)**	**Practical (24 hrs)**	**Duration (40 Hrs)**
	harvesting time etc		

Unit 2: Seed Preparation for Tuber Crop Cultivation			
Learning Outcome	**Theory (20 hrs)**	**Practical (30 hrs)**	**Duration (50 Hrs)**
1. Identify seed tubers and True potato seeds - Potato, Sweet potato, Cassava & Colocasia	1. Seed nomenclature and its understanding	1. Identify use of seed tubers or true potato seed for cultivation based on area / eco system and resistance from pest and diseases	**10**
2. Selection of seed & procurement	1. Criteria for healthy seed and standard for certified tuber crop seed categories 2. Positive and negative selection of parent stock	1. Identify various vendors / suppliers (including government nurseries /department) of the seed that are certified prioritize the service request according to organizational guidelines 2. Sort the healthy plant tubers from infected ones 3. Procure of seed and tubers	**15**
3. Treatment of seed tubers	1. Seed treatment techniques 2. Seed treatments with chemicals	1. Ascertain the tubers free from any soil particles or they are free from any infection 2. Treat the seeds with insecticides (chemical as well as biological) as per the dosage recommended	**15**
4. Understand Seed storage	1. The appropriate storage condition considering aspects like location, temperature, lighting & air circulation 2. advantages and disadvantage of storage lighting categories viz. dark, light and dark light combination 3. Routine monitoring for pest and disease control	1. Store the seed tubers if there is lag in procurement and sowing 2. Make preparations for proper storage of seed Tubers	**10**
Unit 3: Soil Preparation and Planting of Tuber Crop			
Learning Outcome	**Theory (16 hrs)**	**Practical (24 hrs)**	**Duration (40 Hrs)**
1. Understand soil ecology field preparation	1. Various processes in soil sampling & testing 2. Various authorized centers for soil testing	1. identify soil types and nature by getting the soil tested in state government approved	**20**

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Unit 2: Seed Preparation for Tuber Crop Cultivation			
Learning Outcome	**Theory (20 hrs)**	**Practical (30 hrs)**	**Duration (50 Hrs)**
	3. Soil types, acidity and method of soil conservation 4. Level of soil tillage include depth of ploughing 5. Seed bed preparation using recommended mixture of soil and manure	laboratory 2. Perform soil tillage and seed bed preparation	
2. Plant the Tuber Crop	1. Appropriate time for planting by taking into account of soil and climatic conditions 2. Planting method both monoculture and intercropping with recommended spacing 3. Advantages and disadvantages of intercropping and types of plant to be intercropped 4. Advantages of crop rotation	1. Identify the most suitable time for planting tuber crop 2. Plant the tuber crop with right technique using appropriate spacing as per the recommended procedures depending on region and variety 3. Intercrop tuber crop with suitable plants	**20**

Unit 4: Soil Nutrient Management in Vegetable Crops			
Learning Outcome	**Theory (15 hrs)**	**Practical (20 hrs)**	**Duration (35 Hrs)**
1. Macro & micronutrients in soil and its testing	1. Elements / components under macro & micro nutrients 2. Function of each macro & micro nutrient 3. Advantages & disadvantages of particular macro & micro nutrients	1. Understand the basic macro & micro nutrients with their functions 2. Undertake testing of soil to determine its nutrient and fertilizer needs from authorized laboratory 3. Collect soil testing report	**10**
2. Application of organic and chemical fertilizer	1. 1 Application of organic and chemical fertilizer based on soil testing report 2. Application of farm yard manure in appropriate dose and at suitable time (application during first ploughings) 3. Knowledge of vermicompost and the	1. Select appropriate organic fertilizer including farm yard manure for its application 2. Apply organic and inorganic fertilizer in correct dosage and apt time 3. Apply vermicompost and interact with its expert on usage	**10**

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Unit 4: Soil Nutrient Management in Vegetable Crops			
Learning Outcome	**Theory (15 hrs)**	**Practical (20 hrs)**	**Duration (35 Hrs)**
	timing of its application 4. Dosage and application time of fertilizer with required component based on duration of the vegetable crop 5. Appropriate method of fertilizer application		
Total	**67**	**98**	**165**

CLASS 12

Part A - Employability Skills

S.No.	Units	Duration (Hrs)
1.	Communication Skills-IV	25
2.	Self-management Skills-IV	25
3.	Information and Communication Technology Skills-IV	20
4.	Entrepreneurial Skills-IV	25
5.	Green Skills-IV	15
	Total	**110**

Unit 1: Communication Skills-IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Describe the steps to active listening skills	1. Importance of active listening at workplace 2. Steps to active listening	1. Demonstration of the key aspects of becoming active listener 2. Preparing posters of steps for active listening	**10**
2. Demonstrate basic writing skills	2. Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	1. Demonstration and practice of writing sentences and paragraphs on topics related to the subject	**15**

Unit 2: Self-Management-IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Describe the various factors influencing self-motivation	1. Finding and listing motives (needs and desires);	1.Group discussion on identifying needs and desire 2. Discussion on sources of	**10**

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Unit 2: Self-Management-IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
	2. Finding sources of motivation and inspiration (music, books, activities);think expansive thoughts; living fully in the present moment; Dreaming big	motivation and inspiration	
3. Describe the basic personality traits, types and disorders	1. Describe the meaning of personality 2. Describe how personality influence others 3. Describe basic personality traits 4. Describe common personality disorders- paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive	1. Demonstrate the knowledge of different personality types	15

Unit 3: Information and Communication Technology Skills– IV			
Learning Outcome	**Theory (08 hrs)**	**Practical (12 hrs)**	**Duration (20 Hrs)**
1. Perform tabulation using spreadsheet application	1. Introduction to spreadsheet application 2. Spreadsheet applications 3. Creating a new worksheet 4. Opening workbook and entering text 5. Resizing fonts and styles 6. Copying and moving 7. Filter and sorting 8. Formulas and functions 9. Password protection. 10. Printing a spreadsheet. 11. Saving a spreadsheet in various formats.	1. Demonstration and practice on the following: • Introduction to the spreadsheet application • Listing the spreadsheet applications • Creating a new worksheet • Opening the workbook and enter text • Resizing fonts and styles • Copying and move the cell data • Sorting and Filter the data • Applying elementary formulas and functions • Protecting the spreadsheet with password • Printing a spreadsheet • Saving the spreadsheet in various formats.	10

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Unit 3: Information and Communication Technology Skills– IV			
Learning Outcome	**Theory (08 hrs)**	**Practical (12 hrs)**	**Duration (20 Hrs)**
2. Prepare presentation using presentation application	1. Introduction to presentation 2. Software packages for presentation 3. Creating a new presentation 4. Adding a slide 5. Deleting a slide 6. Entering and editing text 7. Formatting text 8. Inserting clipart and images 9. Slide layout 10. Saving a presentation 11. Printing a presentation document.	1. Demonstration and practice on the following: • Listing the software packages for presentation • Explaining the features of presentation • Creating a new presentation • Adding a slide to presentation. • Deleting a slide • Entering and edit text • Formatting text • Inserting clipart and images • Sliding layout • Saving a presentation • Printing a presentation document	**10**

Unit 4: Entrepreneurship Development – IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Describe the general and entrepreneurial behavioural competencies	1. Barriers to becoming entrepreneur 2. Behavioural and entrepreneurial competencies – adaptability/decisiveness, initiative/perseverance, interpersonal skills, organizational skills, stress management, valuing service and diversity	1. Administering self- rating questionnaire and score responses on each of the competencies 2. Collect small story/ anecdote of prominent successful entrepreneurs 3. Identify entrepreneurial competencies reflected in each story and connect it to the definition of behavioural competencies 4. Preparation of competencies profile of students	**10**
2. Self-assessment of behavioural competencies	1. Entrepreneurial competencies in particular: self -confidence, initiative, seeing and acting on opportunities,	1. Games and exercises on changing entrepreneurial behaviour and development of competencies for enhancing self-	**15**

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Unit 4: Entrepreneurship Development – IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
	concern for quality, goal setting and risk taking, problem solving and creativity, systematic planning and efficiency, information seeking, persistence, influencing and negotiating, team building	confidence, problem solving, goal setting, information seeking, team building and creativity	

Unit 5: Green Skills –IV			
Learning Outcome	**Theory (05 hrs)**	**Practical (10 hrs)**	**Duration (15 Hrs)**
1. Describe the role of green jobs	1. Role of green jobs in toxin-free homes, 2. Green organic gardening, public transport and energy conservation, 3. Green jobs in water conservation 4. Green jobs in solar and wind power, waste reduction, reuse and recycling of wastes, 5. Green jobs in green tourism 6. Green jobs in building and construction 7. Green jobs in appropriate technology 8. Role of green jobs in Improving energy and raw materials use 9. Role of green jobs in limiting greenhouse gas emissions 10. Role of green jobs minimizing waste and pollution 11. Role of green jobs in protecting and restoring ecosystems 12. Role of green jobs in support adaptation to the effects of climate change	1. Listing of green jobs and preparation of posters on green job profiles 2. Prepare posters on green jobs.	**15**
Total	**43**	**67**	**110**

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Part B–Vocational Skills

Sino.	Units	Duration (Hrs)
1.	Irrigation management in vegetable crops	30
2.	Weed control and management in vegetable crops	15
3.	Integrated pest and disease management in vegetable crops	20
4.	Harvest and post harvest management in tuber crop	55
5.	Basic Farm Management	45
	Total	**165**

Unit 1: Irrigation Management in Vegetable Crops			
Learning Outcome	**Theory (12 hrs)**	**Practical (18 hrs)**	**Duration (30 Hrs)**
1. Identifying and selecting irrigation system	1. Characteristics of good irrigation system 2. Different types of irrigation system 3. Quantity of water required for the specific crop and its affect on its yield 4. Frequency of irrigation required at various stage of plant growth	1. Identification of different irrigation system 2. Identification of different components of drip irrigation system	**15**
2. Irrigating the vegetable crop	1. Suitability of different methods of irrigation 2. Advantage and disadvantage of methods of irrigation 3. Critical stages of irrigation 4. Selection of the best time of the day to irrigate the crops	1. Visit to a vegetable production farm and observe the available irrigation methods. 2. Enlist the advantages and disadvantages of different methods of irrigation.	**15**

Unit 2: Weed Control and Management in Vegetable Crops			
Learning Outcome	**Theory (06 hrs)**	**Practical (09 hrs)**	**Duration (15Hrs)**
1. Describe the importance of weeds	1. Define weeds 2. Major weeds of Vegetable crops	1. Enlist the major weeds found in your school campus	**10**
2. Identify the Weeds	1. Various types of Weed (broadleaf, grass weed etc) 2. Types of weed and their efficient control methods	2. Identify the types of weed in the vegetable crops	**10**
3. Apply weed Management at various stages of plant	1. Advantages and disadvantages of weeding methods	1. Demonstration of procedure for controlling weeds through application	**10**

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Unit 2: Weed Control and Management in Vegetable Crops			
Learning Outcome	**Theory (06 hrs)**	**Practical (09 hrs)**	**Duration (15Hrs)**
cycle	(herbicide & mechanical) 2. Critical stages of weed control (first weeding time) 3. Use of different methods to control weeds such as plastic mulch 4. Procedures involved in soil solarization	of physical, cultural, biological and chemical methods	

Unit 3: Integrated Pest and Disease Management in Vegetable crops			
Learning Outcome	**Theory (08 hrs)**	**Practical (12 hrs)**	**Duration (20 Hrs)**
1. Identify pests and understand their behavior	1. Importance of safe production and safe produce 2. Vegetable crop growing conditions (soil conditions, temperature etc) 3. Advantages of natural enemies	1. Identify types of pests (cutworm, nematode, leaf miner fly, potato tuber moth, aphid) in vegetable crops 2. Identify stages of crop and pest incidence 3. Diagnose symptoms and extent of damage 4. Understand natural enemies of the pest such as lady bird, ground beetles,	**10**
2. Identify diseases	1. Common diseases of vegetable crops and control measures 2. Describe fungicides and its uses 3. Mode of transmissions of disease such implements, vectors, water, rain, wind 4. Symptoms of various types of diseases	1. Identification of common diseases in vegetable crops.	**10**
3. Following preventive and curative methods	1. Various mechanical control (traps, sticky plates etc) 2. Advantages of biological control of insects, pest & diseases 3. Handling tools and equipment 4. National and international standards on pesticide residues	1. visit to a vegetable production farm and observe the various preventive measures for the common diseases	**15**

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Unit 4: Harvest and Post Harvest Management in Tuber Crops			
Learning Outcome	**Theory (22 hrs)**	**Practical (33 hrs)**	**Duration (55 Hrs)**
1. Identify the Stage of harvesting	1. Define harvesting indices 2. Differentiate between maturity and ripening 3. Differentiate between climacteric and non-climacteric 4. Types of maturity indices (physical and chemical) 5. Harvesting the Tuber crop at right Stage	1. Select right time of Harvesting given crops 2. Identified climacteric and non-climacteric fruit 3. Picked the vegetable as per harvesting standards 4. Demonstrate the use of harvesting tools	**15**
2. Describe harvesting technique	1. Methods of harvesting 2. Tools and container used for harvesting 3. Time of harvesting 4. Precaution taken during harvesting	1. Identify tools and implement used in harvesting 2. Properly harvesting fruits of given crops 3. Properly harvesting vegetable of given crops	**10**
3. Perform harvesting	1. Advantages of pruning of the crop 2. Ideal stage of harvesting 3. Advantages and disadvantages of various harvesting methods	1. Prune plants before harvesting (for seed production) 2. harvest the crop at appropriate stage 3. harvest the crop at right time (for quick drying & hardening of yield) 4. identify the appropriate harvesting method	**10**
4. Carry out Storage & post harvest management	1. Storage condition and method to prevent rotting and spread of diseases (spreading on dry floor) 2. Inhibitors to be used for controlling sprouts in tubers during storage 3. Sorting of infected and damaged tubers 4. demand of produce in various seasons	1. Maintain ideal storage condition 2. Ensure management of storage pest 3. undertake sprout control in storage	**10**
5. Carry out marketing of field produce	1. Different sources of price information 2. Demand of produce in various seasons 3. Prices of produce in various seasons	1. Enlist the sources of price information of the produce	**10**

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Unit 5: Basic Farm Management			
Learning Outcome	**Theory (18 hrs)**	**Practical (27 hrs)**	**Duration (45 Hrs)**
1. Identify farm building and infrastructure	1. Define Farm Management 2. Different space requirement at vegetable Farm 3. Various types of building at a vegetable farm	1. Enlist the different types of buildings and other space required at a farm	10
2. Select the crops for growing	1. Selection of vegetable crop for growing 2. Crop rotation and intercropping 3. Benefits of crop rotation in vegetable cultivation	1. Enlist the Selection criteria for vegetable crop growing at a farm	10
3. Apply financial Management	1. cost of production 2. How to calculate cost of production 3. What is farm Record keeping and various methods of record keeping 4. Basic accounting principles 5. Understand basic book keeping principle	1. Calculate the cost of production	15
4. Know the marketing systems	1. Describe the demand and supply of vegetables 2. Different of vegetable marketing system 3. How the prices are fluctuate 4. Describe the different means of transportation in marketing	1. Enlist the different marketing vegetable system	10
Total	**66**	**99**	**165**

6. ORGANISATION OF FIELD VISITS

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace.

Visit a Vegetable Farm and observe the fol owing: Location, Site, Office building, Store, Pot yard, Packing Yard, Seed bed, Nursery bed, Water tank/Tube wel , Gate and fencing. During the visit,

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students should obtain the fol owing information from the owner or the supervisor of the Vegetable Farm:

1. Area under Cultivation and its layout
2. Types of vegetable raised
3. Name of varieties grown
4. Number of crops raised annual y
5. Total production of particular vegetable grown annual y
6. Sale procedure
7. Manpower engaged
8. Total expenditure of growing vegetables
9. Total annual income
10. Profit/Loss (Annual)
11. Any other information

7. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

1. Farmyard Manure
2. Fertilizers
3. Garden Hand Tools
4. Garden Hoes

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5. Garden Knife
6. Garden Rake
7. Garden/Digging Fork
8. Garden/Digging Spade
9. Hand Screens/Sieves
10. Hoe
11. Hori Hori Knife
12. Knapsack Sprayer
13. Leaf Rake
14. Long Handle Hoes
15. Loppers or Pruning Saw
16. Plastics Baskets
17. Poly bags (different sizes)
18. Plug trays
19. Pruners
20. Rabbiting Spade
21. Sanitizers
22. Secateurs
23. Seed Cleaner
24. Seed Treating Equipment
25. Shovels and Specialty Spades

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26. Soil Scoop
27. Sprinkler Irrigation Unit
28. Drip Irrigation Unit
29. Dutch Hand Hoe
30. Trowels
31. Vermicompost
32. Water Hose
33. Watering Can
34. Wheelbarrow or Garden Cart

8. VOCATIONAL TEACHER'S/ TRAINER'S QUALIFICATION AND GUIDELINES

Qualification and other requirements for appointment of vocational teachers/trainers on contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as fol ows:

S. No.	Qualification	Minimum Competencies	Age Limit
1.	Post-graduation in Horticulture from a recognized Institute/University, with at least 1 year work/teaching experience	• Effective communication skills (oral and written) • Basic computing skills.	18-37 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules

Vocational Teachers/Trainers form the backbone of Vocational Education being imparted as an integral part of Rashtriya Madhyamik Shiksha *Abhiyan* (RMSA). They are directly involved in teaching of vocational subjects and also serve as a link between the

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industry and the schools for arranging industry visits, On-the-Job Training (OJT) and placement.

These guidelines have been prepared with an aim to help and guide the States in engaging quality Vocational Teachers/Trainers in the schools. Various parameters that need to be looked into while engaging the Vocational Teachers/Trainers are mode and procedure of selection of Vocational Teachers/Trainers, Educational Qualifications, Industry Experience, and Certification/Accreditation.

The State may engage Vocational Teachers/Trainers in schools approved under the component of Vocationalisation of Secondary and Higher Secondary Education under RMSA in the fol owing ways:

(i) directly as per the prescribed qualifications and industry experience suggested by the PSS Central Institute of Vocational Education(PSSCIVE), NCERT or the respective Sector Skil Council(SSC)

OR

(ii) Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF*) approved by the National Skil Qualification Committee on 21.07.2016. If the State is engaging Vocational Teachers/Trainers through the Vocational Training Provider (VTP), it should ensure that VTP should have been accredited at NQAF Level 2 or higher.

The educational qualifications required for being a Vocational Teacher/Trainer for a particular job role are clearly mentioned in the curriculum for the particular NSQF compliant job role. The State

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should ensure that teachers / trainers deployed in the schools have relevant technical competencies for the NSQF qualification being delivered. The Vocational Teachers/Trainers preferably should be certified by the concerned Sector Skil Council for the particular Qualification Pack/Job role which he wil be teaching. Copies of relevant certificates and/or record of experience of the teacher/trainer in the industry should be kept as record.

To ensure the quality of the Vocational Teachers/Trainers, the State should ensure that a standardized procedure for selection of Vocational Teachers/Trainers is fol owed. The selection procedure should consist of the fol owing:

(i) Written test for the technical/domain specific knowledge related to the sector;

(ii) Interview for assessing the knowledge, interests and aptitude of trainer through a panel of experts from the field and state representatives; and

(iii) Practical test/mock test in classroom/workshop/laboratory.

In case of appointment through VTPs, the selection may be done based on the above procedure by a committee having representatives of both the State Government and the VTP.

The State should ensure that the Vocational Teachers/Trainers who are recruited should undergo induction training of 20 days for understanding the scheme, NSQF framework and Vocational Pedagogy before being deployed in the schools.

The State should ensure that the existing trainers undergo in-service training of 5 days every year to make them aware of the relevant and

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new techniques/approaches in their sector and understand the latest trends and policy reforms in vocational education.

The Head Master/Principal of the school where the scheme is being implemented should facilitate and ensure that the Vocational Teachers/Trainers:

(i) Prepare session plans and deliver sessions which have a clear and relevant purpose and which engage the students;

(ii) Deliver education and training activities to students, based on the curriculum to achieve the learning outcomes;

(iii) Make effective use of learning aids and ICT tools during the classroom sessions;

(iv) Engage students in learning activities, which include a mix of different methodologies, such as project based work, team work, practical and simulation based learning experiences;

(v) Work with the institution's management to organise skil demonstrations, site visits, on-job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;

(vi) Identify the weaknesses of students and assist them in upgradation of competency;

(vii) Cater to different learning styles and level of ability of students;

(viii) Assess the learning needs and abilities, when working with students with different abilities

(ix) Identify any additional support the student may need and help to make special arrangements

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for that support;

(x) Provide placement assistance

Assessment and evaluation of Vocational Teachers/Trainers is very critical for making them aware of their performance and for suggesting corrective actions. The States/UTs should ensure that the performance of the Vocational Teachers/Trainers is appraised annual y. Performance based appraisal in relation to certain pre-established criteria and objectives should be done periodical y to ensure the quality of the Vocational Teachers/Trainers. Fol owing parameters may be considered during the appraisal process:

1. Participation in guidance and counsel ing activities conducted at Institutional, District and State level;

2. Adoption of innovative teaching and training methods;

3. Improvement in result of vocational students of Class X or Class XII;

4. Continuous upgradation of knowledge and skil s related to the vocational pedagogy, communication skil s and vocational subject;

5. Membership of professional society at District, State, Regional, National and International level;

6. Development of teaching-learning materials in the subject area;

7. Efforts made in developing linkages with the Industry/Establishments;

8. Efforts made towards involving the local community in Vocational Education

9. Publication of papers in National and International Journals;

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10. Organisation of activities for promotion of vocational subjects;

11. Involvement in placement of students/student support services.

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