

# LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

## JOB ROLE: HYDROPONICS TECHNICIAN

(QUALIFICATION PACK: Ref. Id. AGR/Q0808)

### SECTOR: AGRICULTURE

Grades 11 and 12



विद्यया ऽ मृतमश्नुते



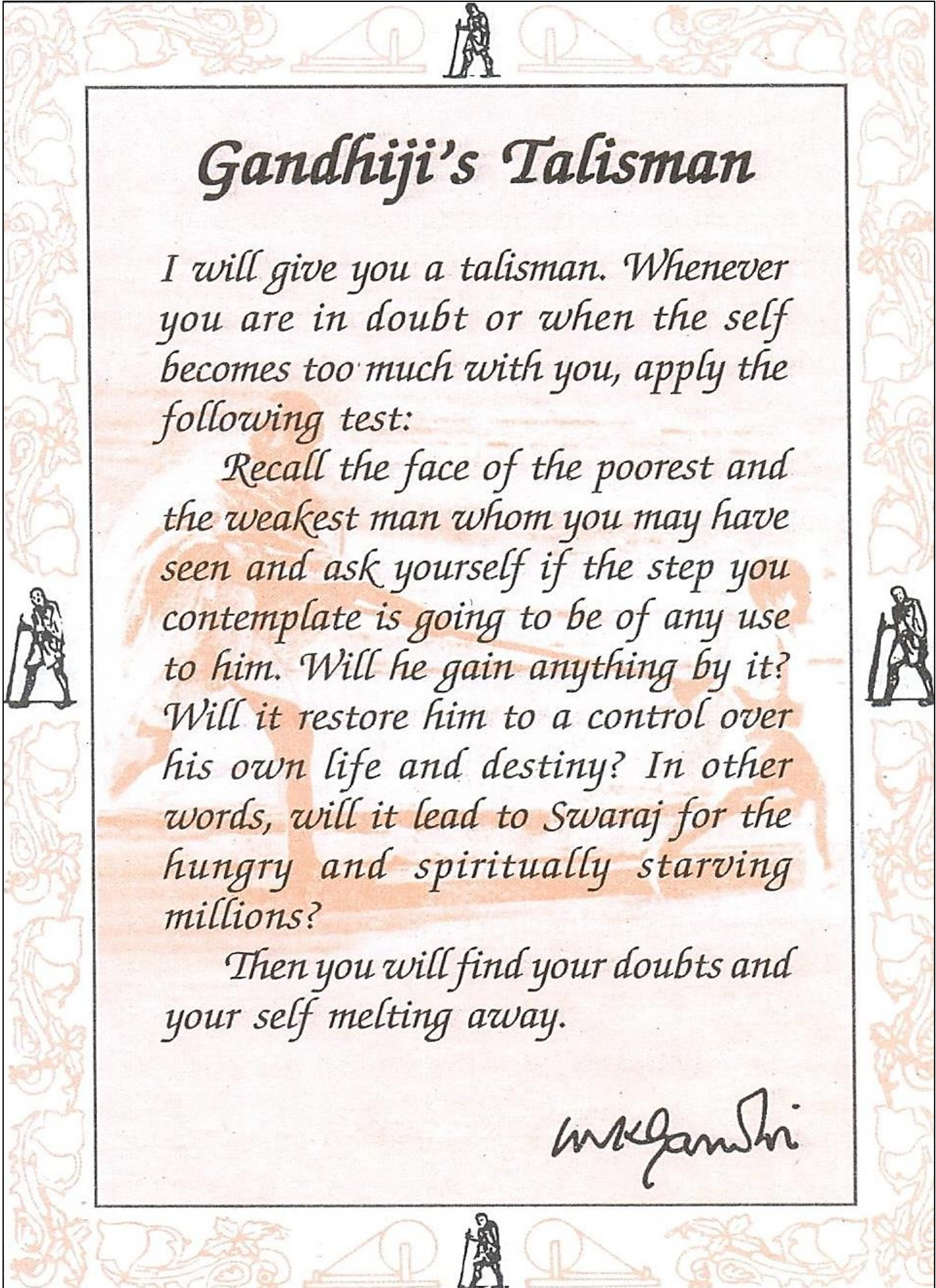
एन सी ई आर टी  
NCERT

**PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION**

(a constituent unit of NCERT, under MoE, Government of India)

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

<http://www.psscive.ac.in>



## 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*

# **LEARNING OUTCOME BASED VOCATIONAL CURRICULUM**

**JOB ROLE: HYDROPONICS TECHNICIAN**

**(QUALIFICATION PACK: Ref. Id. AGR/Q0808)**

**SECTOR: AGRICULTURE**

**Grades 11 and 12**



**PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION**

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

---

**LEARNING OUTCOME BASED VOCATIONAL  
CURRICULUM  
Agriculture- Hydroponics Technician**

**October, 2023**

**© PSSCIVE, 2023**

**<http://www.psscive.ac.in>**

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being used by the purchaser of the work.

The views and opinions expressed in this publication are those of the contributors/ authors and do not necessarily reflect the views and policies of PSS Central Institute of Vocational Education, Bhopal. The PSSCIVE does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

**Published by:**

Joint Director  
PSS Central Institute of Vocational  
Education, NCERT, Shyamla Hills, Bhopal



**PATRONS**

Dr. Deepak Paliwal  
*Joint Director*  
*PSS Central Institute of Vocational Education*  
*Bhopal*

**COURSE COORDINATOR**

Dr. Rajiv Kumar Pathak  
*Professor & Head*  
*Dept. of Agriculture & Animal Husbandry*  
*PSS Central Institute of Vocational Education*  
*Bhopal*

## 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 education to open pathways of career progression for students. The curriculum has been developed for the vocational education programme introduced under the Centrally Sponsored Scheme of Samagra Shiksha of the Ministry of Education (erstwhile, Ministry of Human Resource Development) and is aligned to the National Skill Qualifications Framework (NSQF). The curricula for vocational courses are being developed under the project approved by the Project Approval Board (PAB) of 'Samagra Shiksha', which is an overarching programme for the school education sector extending from pre-school to Grade 12.

It is a matter of great pleasure to introduce this learning outcome-based curriculum as part of the vocational training package for the job role of Hydroponics technician. The curriculum has been developed for the secondary students of Grades 11 and 12 and is aligned to the National Occupation Standards (NOSs) for the job role. The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employers' immediate skill needs. The teaching-learning is to be done through interactive sessions in classrooms, practical activities in laboratories or workshops, projects, field visits, etc. and professional experience is to be provided through on-the-job training.

The curriculum has been developed and reviewed by a group of experts and their contributions are duly 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 will be of immense value to us in bringing about further improvement in this document.

**DINESH PRASAD SAKLANI**

*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 is immense and the possibilities are equally exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. In order to fulfil the growing aspirations of our youth and the demand for a skilled human resource, the Ministry of Education (erstwhile, Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of School 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 skilled manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted with the responsibility to develop learning outcome-based curricula, student textbooks and e-learning material for job roles in various sectors.

The PSSCIVE firmly believes that the vocationalisation of education in the nation needs 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 skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfil the needs of society and the world of work. In order to honour its commitment to the nation, the PSSCIVE is developing learning outcome-based curricula with the involvement of faculty members and leading experts in the field. It is being done through the concerted efforts of leading academicians, professionals, policymakers, partner institutions, Vocational Education and Training (VET) experts, industry representatives, and teachers. The expert group, through a series of consultations, working group meetings and use of reference materials develops a national curriculum. We extend our gratitude to all the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of curriculum.

The success of this curriculum depends upon its effective implementation, and it is expected that the managers of vocational education programme, vocational educators, vocational teachers/trainers, and other stakeholders will make earnest efforts to provide better facilities, develop linkages with the industry or world of work and foster a conducive learning environment for the students for effectively transacting the curriculum and to achieve the learning outcomes as per the content of the curriculum document.

**DEEPAK PALIWAL**

*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 *Samagra Shiksha* and the officials of the Ministry of Education (MoE), 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 colleagues at the Technical Support Group of *Samagra Shiksha*, MoE, SS Cell at the National Council of Educational Research and Training (NCERT), National Skill Development Agency (NSDA), National Skill Development Corporation (NSDC) and Agriculture Skill 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. Their names are acknowledged in the list of contributors and reviewers.

We are also grateful to Prof. Rajiv Pathak, Course Coordinator, Department of Agriculture and Animal Husbandry, PSSCIVE, Bhopal for his contributions.

The contributions made by Dr. Vinay Swarup Mehrotra, Professor, Curriculum Development and Evaluation Centre (CDEC), Dr. Vipin Kumar Jain, Associate Professor, Department of Humanities, Science, Education and Research and Dr. Dipak D. Shudhalwar, Professor, Department of Engineering and Technology, PSSCIVE in development of the curriculum for the employability skills are duly acknowledged.

The suggestions and editorial support provided by Dr. Archit Singh, Dr. Ankita Sharma, Mr. Aman Kumar and Ms. Pooja Sharma, Assistant Professors (Contractual), Department of Agriculture and Animal Husbandry, PSSCIVE are duly appreciated and acknowledged.

**PSSCIVE Team**

# CONTENTS

S.No.	Title		Page No.	
	Foreword		i	
	Preface		ii	
	Acknowledgement		iii	
1.	Course Overview		1	
2.	Scheme of Units and Assessment		2	
3.	Teaching/Training Activities		3	
4.	Certification		4	
5.	Unit Content	<b>CLASS 11</b>		
		<b>Part A</b>	<b>Employability Skills</b>	
			Unit 1: Communication Skills – I	6
			Unit 2: Self-management Skills – I	8
			Unit 3: Information and Communication Technology Skills – I	9
			Unit 4: Entrepreneurial Skills – I	11
			Unit 5: Green Skills – I	12
		<b>Part B</b>	<b>Vocational Skills</b>	
			Unit 1: Introduction to Hydroponics	13
			Unit 2: Process of setting up of Hydroponics	13
			Unit 3: Maintenance the Hydroponic system	14
		<b>CLASS 12</b>		
		<b>Part A</b>	<b>Employability Skills</b>	
			Unit 1: Communication Skills – II	15
			Unit 2: Self-management Skills – II	16
			Unit 3: Information and Communication Technology Skills – II	16
			Unit 4: Entrepreneurial Skills – II	18
			Unit 5: Green Skills – II	19
		<b>Part B</b>	<b>Vocational Skills</b>	
			Unit 1: Management of hydroponic crop	20
Unit 2: Process of carrying out harvesting and post-harvest management of Hydroponic produce	20			
Unit 3: Basic marketing activities for small enterprise	21			
	Unit 4: Hygiene, cleanliness, safety and emergency procedures	21		
6.	Organisation of Field Visits		22	
7.	List of Equipment and Materials		22	
8.	Vocational Teachers/ Trainers Qualification and Guidelines		23	
9.	List of Reference books		25	
10.	List of Contributors		26	
11.	List of Reviewers		26	



# 1. COURSE OVERVIEW

---

## COURSE TITLE: Agriculture – Hydroponics Technician

A Hydroponics Technician is a person who grows plants in a controlled environment using alternative materials instead of soil as per the hydroponics farming method. The individual is also responsible for setting and maintaining a hydroponic farm apart from maintaining, harvesting and marketing the plants grown at the farm. The individual must be physically fit to work for long durations. The person must have attention to detail, problem-solving skills with the ability to work collaboratively with others to achieve the work objectives.

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

- Apply effective oral and written communication skills to interact with people and customers;
- Identify the principal components of a computer system;
- Demonstrate the basic skills of using computer;
- Demonstrate self-management skills;
- Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills & abilities;
- Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
- Communicate effectively with the client
- Identify the principal components of a computer system
- Describe Hydroponics and its importance
- Identify the different types of hydroponic system
- Select the crop/ plant and site for hydroponic system
- Demonstrate growing of seedlings for hydroponic system
- Demonstrate care and maintenance of the hydroponic system
- Demonstrate Pests and diseases management
- Demonstrate the process of carrying out harvesting
- Demonstrate harvest and post-harvest operations
- Ensure hygiene, cleanliness, safety and emergency procedures

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

**COURSE LEVEL:** On completion of this course, a student can take up a higher level course for a job role in Hydroponics.

<b>COURSE DURATION:</b>	<b>600 hrs</b>
Class 11	: 300 hrs
Class 12	: 300 hrs
<b>Total</b>	<b>: 600 hrs</b>

## 2. SCHEME OF UNITS AND ASSESSMENT

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Grades 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 follows:

The unit-wise distribution of hours and marks for Grade 11 is as follows:

<b>GRADE 11</b>			
	<b>Units</b>	<b>No. of Hours for Theory and Practical 300</b>	<b>Max. Marks for Theory and Practical 100</b>
<b>Part A</b>	<b>Employability Skills</b>		
	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	
	<b>Total</b>	<b>110</b>	<b>10</b>
<b>Part B</b>	<b>Vocational Skills</b>		
	Unit1: Introduction to Hydroponics	40	40
	Unit2: Process of setting up of hydroponics	75	
	Unit3: Maintenance the hydroponic system	50	
	<b>Total</b>	<b>165</b>	<b>40</b>
<b>Part C</b>	<b>Practical Work</b>		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	<b>Total</b>	<b>10</b>	<b>35</b>
<b>Part D</b>	<b>Project Work/Field Visit</b>		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	<b>Total</b>	<b>15</b>	<b>15</b>
	<b>Grand Total</b>	<b>300</b>	<b>100</b>

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

<b>GRADE 12</b>			
	<b>Units</b>	<b>No. of Hours for Theory and Practical 200</b>	<b>Max. Marks for Theory and Practical 100</b>
<b>Part A</b>	<b>Employability Skills</b>		
	Unit 1: Communication Skills – IV	25	10
	Unit 2: Self-management Skills – IV	25	
	Unit 3: Information and Communication Technology Skills – IV	20	
	Unit 4: Entrepreneurial Skills – IV	25	
	Unit 5: Green Skills – IV	15	
	<b>Total</b>	<b>110</b>	<b>10</b>
<b>Part B</b>	<b>Vocational Skills</b>		
	Unit 1: Management of Hydroponic crop	40	40
	Unit 2: Process of carrying out harvesting and post-harvest management of Hydroponic produce	55	
	Unit 3: Basic marketing activities for small enterprise	25	
	Unit 4: Hygiene, cleanliness, safety and emergency procedures	45	
	<b>Total</b>	<b>165</b>	<b>40</b>
<b>Part C</b>	<b>Practical Work</b>		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	<b>Total</b>	<b>10</b>	<b>35</b>
<b>Part D</b>	<b>Project Work/Field Visit</b>		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	<b>Total</b>	<b>15</b>	<b>15</b>
	<b>Grand Total</b>	<b>300</b>	<b>100</b>

### 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 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, followed 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, skills 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 collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for 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. ASSESMENT AND CERTIFICATION**

---

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

The National Skills 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 skills, core skills and responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skills 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 all 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 examination, including theory examination to be conducted by the Board. The assessment tools shall 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** allows 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/colleges or industry. The respective Sector Skill 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 follows:

Duration: 3 hrs

Max. Mark: 40

	Typology of Question	No. of Questions			Marks
		Very Short Answer (1 mark)	Short Answer (2 Marks)	Long Answer (3 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, provide 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
	<b>Total</b>	<b>5x1=5</b>	<b>10x2=20</b>	<b>5x3=15</b>	<b>40 (20 questions)</b>

### SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills 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 will indicate that they are 'competent', or are 'not yet competent'. The assessors assessing the skills 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 Skill Councils should ensure that the assessors are provided with the training on the assessment of competencies.

**Practical examination** allows 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 Skill Council. The same team of examiners will conduct the viva voce.

**Project Work** (individual or group project) is a great way to assess the practical skills 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 be discussed in the class and the teacher should periodically 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 followed by a small-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** allows candidates to demonstrate communication skills 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

### GRADE 11

#### Part A: Employability Skills

S.No.	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
	<b>Total</b>	<b>110</b>

Unit 1: Communication Skills – III			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. Demonstrate knowledge of communication	1. Introduction to communication process 2. Importance of communication 3. Elements of communication 4. Perspectives in communication 5. Effective communication	1. Role play on the communication process 2. Group discussion on the importance of communication and factors affecting perspectives in communication 3. Charts preparation on elements of	03

		communication 4. Classroom discussion on the 7Cs (i.e. Clear, Concise, Concrete, Correct, Coherent, Courteous and Complete) for effective communication	
2. Demonstrate verbal communication	1. Verbal communication 2. Public Speaking	1. Role-play of a phone conversation. 2. Group activity on delivering a speech and practicing public speaking	02
3. Demonstrate non-verbal communication	1. Importance of non-verbal communication 2. Types of non-verbal communication 3. Visual communication	1. Role-play on non-verbal communication 2. Group exercise and discussion on Do's and Don'ts to avoid body language mistakes 3. Group activity on methods of communication	02
4. Demonstrate speech using correct pronunciation	1. Pronunciation basics 2. Speaking properly 3. Phonetics 4. Types of sounds	1. Group activities on practicing pronunciation	01
i. Apply an assertive communication style	1. Important communication styles 2. Assertive communication 3. Advantages of assertive communication 4. Practicing assertive communication	1. Group discussion on communication styles 2. Group discussion on observing and sharing communication styles	03
ii. Demonstrate the knowledge of saying no	1. Steps for saying 'No' 2. Connecting words	1. Group discussion on how to say 'No'	02
iii. Identify and use parts of speech in writing	1. Capitalisation 2. Punctuation 3. Basic parts of speech 4. Supporting parts of speech	1. Group activity on identifying parts of speech 2. Writing a paragraph with punctuation marks 3. Group activity on constructing sentences 4. Group activity on identifying parts of speech	03
iv. Write correct sentences	1. Parts of a sentence 2. Types of object	1. Activity on framing sentences	

	and paragraphs	3. Types of sentences 4. Paragraph	2. Activity on active and passive voice 3. Assignment on writing different types of sentences	02
v.	Communicate with people	1. Greetings 2. Introducing self and others	1. Role-play on formal and informal greetings 2. Role-play on introducing someone 3. Practice and group discussion on how to greet different people?	02
vi.	Introduce yourself to others and write about oneself	1. Talking about self 2. Filling a form	1. Practicing self-introduction and filling up forms 2. Practicing self-introduction to others	01
vii.	Develop questioning skill	1. Main types of questions 2. Forming closed and open-ended questions	1. Practice exercise on forming questions 2. Group activity on framing questions	01
viii.	Communicate information about family to others	1. Names of relatives 2. Relations	1. Practice talking about family 2. Role-play on talking about family members.	01
ix.	Describe habits and routines	1. Concept of habits and routines	1. Group discussion on habits and routines 2. Group activity on describing routines	01
x.	Ask or give directions to others	1. Asking for directions 2. Using landmarks	1. Role-play on asking and giving directions 2. Identifying symbols used for giving directions	01
<b>Total</b>				<b>25</b>

<b>Unit 2: Self-Management-III</b>			
<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (15 hrs)</b>	<b>Duration (25 hrs)</b>
1. Identify and analyse own strengths and weaknesses	1. Understanding self 2. Techniques for identifying strengths and weaknesses 3. Difference between interests and abilities	1. Activity on writing aims in life 2. Preparing a worksheet on interests and abilities	03



2. Demonstrate personal grooming skills	1. Guidelines for dressing and grooming 2. Preparing a personal grooming checklist	1. Role-play on dressing and grooming standards 2. Self-reflection activity on various aspects of personal grooming	04
3. Maintaining personal hygiene	1. Importance of personal hygiene 2. Three steps to personal hygiene 3. Essential steps of hand washing	1. Role-play on personal hygiene 2. Assignment on personal hygiene	03
4. Demonstrate the knowledge of working in a team and participating in group activities	1. Describe the benefits of teamwork 2. Working in a team	1. Assignment on working in a team 2. Self-reflection on teamwork	03
5. Develop networking skills	1. Benefits of networking skills 2. Steps to build networking skills	1. Group activity on networking in action 2. Assignment on networking skills	03
6. Describe the meaning and importance of self-motivation	1. Meaning of self-motivation 2. Types of motivation 3. Steps to building self-motivation	1. Activity on staying motivated 2. Assignment on reasons hindering motivation	03
7. Set goals	1. Meaning of goals and purpose of goal-setting 2. Setting SMART goals	1. Assignment on setting SMART goals 2. Activity on developing long-term and short-term goals using SMART method	03
8. Apply time management strategies and techniques	1. Meaning and importance of time management 2. Steps for effective time management	1. Preparing a checklist of daily activities	03
<b>Total</b>			<b>25</b>

**Unit 3: Information And Communication Technology-III**

<b>Learning Outcome</b>	<b>Theory (08 hrs)</b>	<b>Practical (12 hrs)</b>	<b>Duration (20 hrs)</b>
1. Create a document on the word processor	1. Introduction to ICT 2. Advantages of using a word processor. 3. Work with Libre Office Writer	1. Demonstration and practice of the following: <ul style="list-style-type: none"> <li>• Creating a new document</li> <li>• Typing text</li> <li>• Saving the text</li> <li>• Opening and saving file on Microsoft Word/Libre Office</li> </ul>	02

		Writer.	
2. Identify icons on the toolbar	<ol style="list-style-type: none"> <li>1. Status bar</li> <li>2. Menu bar</li> <li>3. Icons on the Menu bar</li> <li>4. Multiple ways to perform a function</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on using basic user interface of LibreOffice writer</li> <li>2. Group activity on working with Microsoft Word</li> </ol>	02
3. Save, close, open and print document	<ol style="list-style-type: none"> <li>1. Save a word document</li> <li>2. Close a word document</li> <li>3. Open an existing document</li> <li>4. Print</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on performing the functions for saving, closing and printing documents in LibreOffice Writer</li> <li>2. Group activity on performing the functions for saving, closing and printing documents in Microsoft Word</li> </ol>	02
4. Format text in a word document	<ol style="list-style-type: none"> <li>1. Change style and size of text</li> <li>2. Align text</li> <li>3. Cut, Copy, Paste</li> <li>4. Find and replace</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on formatting text in LibreOffice Writer</li> <li>2. Group activity on formatting text in Microsoft Word</li> </ol>	02
5. Check spelling and grammar in a word document	<ol style="list-style-type: none"> <li>1. Use of spell checker</li> <li>2. Autocorrect</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on checking spellings and grammar using LibreOffice Writer</li> <li>2. Group activity on checking spellings and grammar using Microsoft Word</li> </ol>	02
6. Insert lists, tables, pictures, and shapes in a word document	<ol style="list-style-type: none"> <li>1. Insert bullet list</li> <li>2. Number list</li> <li>3. Tables</li> <li>4. Pictures</li> <li>5. Shapes</li> </ol>	<ol style="list-style-type: none"> <li>1. Practical exercise of inserting lists and tables using LibreOffice Writer</li> </ol>	03
7. Insert header, footer and page number in a word document	<ol style="list-style-type: none"> <li>1. Insert header</li> <li>2. Insert footer</li> <li>3. Insert page number</li> <li>4. Page count</li> </ol>	<ol style="list-style-type: none"> <li>1. Practical exercise of inserting header, footer and page numbers in LibreOffice Writer</li> <li>2. Practical exercise of inserting header, footer and page numbers in Microsoft Word</li> </ol>	03
8. Make changes by using the track change option in a word document	<ol style="list-style-type: none"> <li>1. Tracking option</li> <li>2. Manage option</li> <li>3. Compare documents</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on performing track changes in LibreOffice Writer</li> <li>2. Group activity on performing track changes in Microsoft Word</li> </ol>	04
<b>Total</b>			<b>20</b>

<b>Unit 4: Entrepreneurial Skills – III</b>			
<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (15 hrs)</b>	<b>Duration (25 hrs)</b>
1. Differentiate between different kinds of businesses	1. Introduction to entrepreneurship 2. Types of business activities	1. Role-play on different kinds of businesses around us	03
2. Describe the significance of entrepreneurial values	1. Meaning of value 2. Values of an Entrepreneur 3. Case study on qualities of an entrepreneur	1. Role-play on qualities of an entrepreneur	03
3. Demonstrate the attitudinal changes required to become an entrepreneur	1. Difference between the attitude of entrepreneur and employee	1. Interviewing employees and entrepreneurs	03
4. Develop thinking skills like an entrepreneur	1. Problems of entrepreneurs 2. Problem-solving 3. Ways to think like an entrepreneur	1. Group activity on identifying and solving problems	04
5. Generate business ideas	1. The business cycle 2. Principles of idea creation 3. Generating a business idea 4. Case studies	1. Brainstorming on generating a business ideas	04
6. Describe customer needs and the importance of conducting a customer survey	1. Understanding customer needs 2. Conducting a customer survey	1. Group activity to conduct a customer survey	04
7. Create a business plan	1. Importance of business planning 2. Preparing a business plan 3. Principles to follow for growing a business 4. Case studies	1. Group activity on developing a business plan	04
<b>Total</b>			<b>25</b>

<b>Unit 5: Green Skills – III</b>			
<b>Learning Outcome</b>	<b>Theory (07 hrs)</b>	<b>Practical (08 hrs)</b>	<b>Duration (15 hrs)</b>
1. Describe the importance of the main sector of the green economy	1. Meaning of ecosystem, food chain and sustainable development 2. Main sectors of the green economy- E-waste management, green transportation, renewal energy, green construction, and water management	1. Group discussion on sectors of green economy 2. Poster making on various sectors for promoting green economy	06
2. Describe the main recommendations of policies for the green economy	1. Policies for a green economy	1. Group discussion on initiatives for promoting the green economy 2. Writing an essay or a short note on the important initiatives for promoting green economy.	03
3. Describe the major green sectors/ areas and the role of various stakeholders in the green economy	1. Stakeholders in the green economy	1. Group discussion on the role of stakeholders in the green economy 2. Making solar bulbs.	03
4. Identify the role of government and private agencies in the green economy	1. Role of the government in promoting a green economy 2. Role of private agencies in promoting green economy	1. Group discussion on the role of Government and Private Agencies in promoting a green economy. 2. Poster making on green sectors.	03
<b>Total</b>			<b>15</b>

## GRADE 11

### Part B: Vocational Skills

<b>S. No.</b>	<b>Units</b>	<b>Duration (Hrs)</b>
1.	Introduction to Hydroponics	40
2.	Process of setting up of hydroponics	75
3.	Maintenance the hydroponic system	50
<b>Total</b>		<b>165</b>

<b>Unit 1: Introduction to Hydroponics</b>			
<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (30 hrs)</b>	<b>Duration (40 Hrs)</b>
1. Describe Hydroponics and its importance	<ol style="list-style-type: none"> <li>1. Define Hydroponics</li> <li>2. Importance of Hydroponics system in India</li> <li>3. Discuss the role and responsibilities of a Hydroponics Technician</li> <li>4. Various employment opportunities for a Hydroponics Technician</li> </ol>	1. Enlist important crops/ plants suitable for Hydroponics	25
2. Select suitable crops for hydroponic cultivation	<ol style="list-style-type: none"> <li>1. Use of hydroponics cultivation in agriculture               <ol style="list-style-type: none"> <li>a. Protected cultivation</li> <li>b. Precision Farming</li> </ol> </li> <li>2. Selection of suitable system and crops for Hydroponics cultivation</li> </ol>	1. Visit nearby Hydroponics unit and identify the crops and varieties	15
<b>Total</b>			<b>40</b>

<b>Unit 2: Process of setting up of Hydroponics</b>			
<b>Learning Outcome</b>	<b>Theory (25 hrs)</b>	<b>Practical(50 hrs)</b>	<b>Duration (75Hrs)</b>
1. Identify the different types of Hydroponic system	<ol style="list-style-type: none"> <li>1. Explain different types of Hydroponic system</li> <li>2. Component of different Hydroponic system</li> <li>3. Process of setting up the Hydroponic system</li> <li>4. Describe substrate/growth medium and nutrient solution for suitable crops</li> </ol>	<ol style="list-style-type: none"> <li>1. Visit nearby hydroponic unit and observe different type of Hydroponic system</li> <li>2. Discuss with owner and note down the different component of Hydroponic system</li> </ol>	35
2. Select suitable site for hydroponic system	<ol style="list-style-type: none"> <li>1. Explain the site selection criteria for Hydroponic system</li> </ol>	1. Visit nearby Hydroponic unit and discuss with owner about site selection	10
3. Demonstrate growing of seedlings for Hydroponic system	<ol style="list-style-type: none"> <li>1. Explain the criteria for selecting a suitable cultivar for Hydroponic propagation</li> <li>2. Describe process of seed testing</li> <li>3. Explain seed treatment</li> <li>4. Describe the process of raising seedlings for Hydroponic system</li> </ol>	2. Demonstrate the process of raising seedlings	30
<b>Total</b>			<b>75</b>

<b>Unit 3: Maintenance the Hydroponic System</b>			
<b>Learning Outcome</b>	<b>Theory (15 hrs)</b>	<b>Practical (30 hrs)</b>	<b>Duration (50 hrs)</b>
1. Demonstrate care and maintenance of the Hydroponic system	<ol style="list-style-type: none"> <li>1. Explain the types of material, tools, and equipment required for setting up different types of Hydroponic system</li> <li>2. Explain the important environmental parameters such as air, wind, humidity, temperature and water quality parameters (Electrical conductivity, TDS and pH)</li> <li>3. Explain the symptoms of plant nutrient deficiency and excess</li> <li>4. Selection and preparation of Nutrient solution (Nutrient solution depends on plants type)</li> <li>5. Describe the appropriate method and timing for the application of nutrient solution</li> <li>6. Describe the process of filtering and sterilising the water and nutrient solution</li> <li>7. Describe the frequency and dose of nutrient solution</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify different tools and equipment used in Hydroponic system</li> <li>2. Visit nearby hydroponic unit and discuss with owner about the maintenance of different environmental parameters</li> <li>3. Demonstrate process of preparation of nutrient solution for different crops/ plants</li> </ol>	40
2. Demonstrate Pests and Diseases management	<ol style="list-style-type: none"> <li>1. Describe common insect-pests and diseases in Hydroponic crops</li> <li>2. Describe Integrated Pest and Disease management</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify different pest and diseases in Hydroponic crops/ plants</li> <li>2. Demonstration of management of insect-pest and diseases</li> </ol>	10
<b>Total</b>			<b>50</b>

# GRADE 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
	<b>Total</b>	<b>110</b>

Unit 1: Communication Skills – IV			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. Demonstrate active listening skills	1. Active listening - listening skill, stages of active listening 2. Overcoming barriers to active listening	1. Group discussion on factors affecting active listening 2. Poster making on steps for active listening 3. Role-play on negative effects of not listening actively	10
2. Identify the parts of speech	1. Parts of speech – using capitals, punctuation, basic parts of speech, Supporting parts of speech	1. Group practice on identifying parts of speech 2. Group practice on constructing sentences	10
3. Write sentences	1. Writing skills to practice the following: <ul style="list-style-type: none"> <li>• Simple sentence</li> <li>• Complex sentence</li> <li>• Types of object</li> </ul> 2. Identify the types of sentences <ul style="list-style-type: none"> <li>• Active and Passive sentences</li> <li>• Statement/</li> <li>• Declarative sentence</li> <li>• Question/</li> <li>• Interrogative sentence</li> <li>- Emotion/ Reaction or Exclamatory sentence</li> <li>- Order or Imperative</li> </ul>	1. Group activity on writing sentences and paragraphs 2. Group activity on practicing writing sentences in active or passive voice 3. Group activity on writing different types of sentences (i.e., declarative, exclamatory, interrogative and imperative)	05

	<p style="text-align: center;">sentence</p> <p>3. Paragraph writing</p>		
<b>Total</b>			<b>25</b>

**Unit 2: Self-Management Skills – IV**

<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (15 hrs)</b>	<b>Duration (25 hrs)</b>
1. Describe the various factors influencing motivation and positive attitude	1. Motivation and positive attitude 2. Intrinsic and extrinsic motivation 3. Positive attitude – ways to maintain positive attitude 4. Stress and stress management - ways to manage stress	1. Role-play on avoiding stressful situations 2. Activity on listing negative situations and ways to turn it positive	10
2. Describe how to become result oriented	1. How to become result oriented? 2. Goal setting – examples of result-oriented goals	1. Group activity on listing aim in life	05
3. Describe the importance of self-awareness and the basic personality traits, types and disorders	1. Steps towards self-awareness 2. Personality and basic personality traits 3. Common personality disorders- <ul style="list-style-type: none"> <li>• Suspicious</li> <li>• Emotional and impulsive</li> <li>• Anxious</li> </ul> 4. Steps to overcome personality disorders	1. Group discussion on self-awareness 2. Group discussion on common personality disorders 3. Brainstorming steps to overcome personality disorder	10
<b>Total</b>			<b>25</b>

**Unit 3: Information And Communication Technology Skills – IV**

<b>Learning Outcome</b>	<b>Theory (06 hrs)</b>	<b>Practical (14 hrs)</b>	<b>Duration (20 hrs)</b>
1. Identify the components of a spreadsheet application	1. Getting started with spreadsheet - types of a spreadsheet, steps to start LibreOffice Calc., components of a worksheet.	1. Group activity on identifying components of spreadsheet in LibreOffice Calc.	02



<p>2. Perform basic operations in a spreadsheet</p>	<ol style="list-style-type: none"> <li>1. Opening workbook and entering data – types of data, steps to enter data, editing and deleting data in a cell</li> <li>2. Selecting multiple cells</li> <li>3. Saving the spreadsheet in various formats</li> <li>4. Closing the spreadsheet</li> <li>5. Opening the spreadsheet.</li> <li>6. Printing the spreadsheet.</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on working with data on LibreOffice Calc.</li> </ol>	<p>03</p>
<p>3. Demonstrate the knowledge of working with data and formatting text</p>	<ol style="list-style-type: none"> <li>1. Using a spreadsheet for addition – adding value directly, adding by using cell address, using a mouse to select values in a formula, using sum function, copying and moving formula</li> <li>2. Need to format cell and content</li> <li>3. Changing text style and font size</li> <li>4. Align text in a cell</li> <li>5. Highlight text</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on formatting a spreadsheet in LibreOffice Calc</li> <li>2. Group activity on performing basic calculations in LibreOffice Calc.</li> </ol>	<p>02</p>
<p>4. Demonstrate the knowledge of using advanced features in spreadsheet</p>	<ol style="list-style-type: none"> <li>1. Sorting data</li> <li>2. Filtering data</li> <li>3. Protecting spreadsheet with password</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on sorting data in LibreOffice Calc</li> </ol>	<p>03</p>
<p>5. Make use of the software used for making slide presentations</p>	<ol style="list-style-type: none"> <li>1. Presentation software available</li> <li>2. Steps to start LibreOffice Impress</li> <li>3. Adding text to a presentation</li> </ol>	<ol style="list-style-type: none"> <li>1. Group practice on working with LibreOffice Impress tools</li> </ol>	<p>02</p>
<p>6. Demonstrate the knowledge to open, close and save slide presentations</p>	<ol style="list-style-type: none"> <li>1. Open, Close, Save and Print a slide presentation</li> </ol>	<ol style="list-style-type: none"> <li>1. Group activity on saving, closing and opening a presentation in LibreOffice Impress</li> </ol>	<p>01</p>

7. Demonstrate the operations related to slides and texts in the presentation	1. Working with slides and text in a presentation-adding slides to a presentation, deleting slides, adding and formatting text, highlighting text, aligning text, changing text colour	1. Group activity on working with font styles in LibreOffice Impress	04
8. Demonstrate the use of advanced features in a presentation	1. Advanced features used in a presentation 2. Inserting shapes in the presentation 3. Inserting clipart and images in a presentation 4. Changing slide layout	1. Group activity on changing slide layout on LibreOffice Impress	03
<b>Total</b>			<b>20</b>

**Unit 4: Entrepreneurial Skills-IV**

<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (15 hrs)</b>	<b>Duration (25 hrs)</b>
1. Describe the concept of entrepreneurship and the types and roles and functions entrepreneur	1. Entrepreneurship and entrepreneur 2. Characteristics of entrepreneurship 3. Entrepreneurship-art and science 4. Qualities of a successful entrepreneur 5. Types of entrepreneurs 6. Roles and functions of an entrepreneur 7. What motivates an entrepreneur 8. Identifying opportunities and risk-taking 9. Startups	1. Group discussion on the topic "An entrepreneur is not born but created". 2. Conducting a classroom quiz on various aspects of entrepreneurship. 3. Chart preparation on types of entrepreneurs 4. Brainstorming activity on What motivates an entrepreneur	10
2. Identify the barriers to entrepreneurship	1. Barriers to entrepreneurship 2. Environmental barriers 3. No or faulty business plan 4. Personal barriers	1. Group discussion about "What we fear about entrepreneurship" 2. Activity on taking an interview of an entrepreneur.	05
3. Identify the attitude that make an entrepreneur successful	1. Entrepreneurial attitude	1. Group activity on identifying entrepreneurial attitude.	05

4. Demonstrate the knowledge of entrepreneurial attitude and competencies	<ol style="list-style-type: none"> <li>1. Entrepreneurial competencies</li> <li>2. Decisiveness</li> <li>3. Initiative</li> <li>4. Interpersonal skills- positive attitude, stress management</li> <li>5. Perseverance</li> <li>6. Organisational skills- time management, goal setting, efficiency, managing quality.</li> </ol>	<ol style="list-style-type: none"> <li>1. Playing games, such as "Who am I".</li> <li>2. Brainstorming a business ideas</li> <li>3. Group practice on "Best out of Waste"</li> <li>4. Group discussion on the topic of "Let's grow together"</li> <li>5. Group activity on listing stress and methods to deal with it like Yoga, deep breathing exercises, etc.</li> <li>6. Group activity on time management</li> </ol>	05
<b>Total</b>			<b>25</b>

**Unit 5: Green Skills-IV**

<b>Learning Outcome</b>	<b>Theory (05 hrs)</b>	<b>Practical (10 hrs)</b>	<b>Duration (15 hrs)</b>
1. Identify the benefits of the green jobs	<ol style="list-style-type: none"> <li>1. Green jobs</li> <li>2. Benefits of green jobs</li> <li>3. Green jobs in different sectors:                             <ul style="list-style-type: none"> <li>• Agriculture</li> <li>• Transportation</li> <li>• Water conservation</li> <li>• Solar and wind energy</li> <li>• Eco-tourism</li> <li>• Building and construction</li> <li>• Solid waste management</li> <li>• Appropriate technology</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Group discussion on the importance of green job.</li> <li>2. Chart preparation on green jobs in different sectors.</li> </ol>	08
2. State the importance of green jobs	<ol style="list-style-type: none"> <li>1. Importance of green jobs in                             <ul style="list-style-type: none"> <li>• Limiting greenhouse gas emissions</li> <li>• Minimizing waste and pollution</li> <li>• Protecting and restoring ecosystems</li> <li>• Adapting to the effects of climate change</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Preparing posters on green jobs.</li> <li>2. Group activity on tree plantation.</li> <li>3. Brainstorming different ways of minimizing waste and pollution</li> </ol>	07
<b>Total</b>			<b>15</b>

**GRADE 12****Part B–Vocational Skills**

S. No.	Units	Duration (Hrs)
1.	Management of Hydroponic crop	40
2	Process of carrying out harvesting and post-harvest management of Hydroponic produce	55
3.	Basic marketing activities for small enterprise	25
4.	Hygiene, cleanliness, safety and emergency procedures	45
	<b>Total</b>	<b>165</b>

<b>Unit 1: Management of Hydroponic crop</b>			
Learning Outcome	Theory (15 hrs)	Practical (25 hrs)	Duration (40 hrs)
1. Maintain hydroponic crops	<ol style="list-style-type: none"> <li>1. Biotic and abiotic factors influencing Hydroponic crops</li> <li>2. Cultural operations for Hydroponic crops</li> <li>3. Precaution taken during Hydroponic cultivation</li> </ol>	<ol style="list-style-type: none"> <li>1. Visit nearby Hydroponics unit and observe cultural operations</li> </ol>	40
<b>Total</b>			<b>40</b>

<b>Unit 2: Process of carrying out harvesting and post-harvest management of Hydroponic produce</b>			
Learning Outcome	Theory (20 hrs)	Practical (35 hrs)	Duration (55 Hrs)
1. Demonstrate the process of carrying out harvesting	<ol style="list-style-type: none"> <li>1. Describe the signs of maturity in different type of crops/ plants</li> <li>2. State the applicable harvesting schedules and techniques</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstrate the harvesting process of different Hydroponic crops/ plants</li> </ol>	20
2. Demonstrate Post-Harvest Handling	<ol style="list-style-type: none"> <li>1. Explain post-harvest management activities such as precooling, washing, cleaning, trimming, sorting, grading, packaging, labelling and transportation of the harvested produce</li> <li>2. Describe different methods of storage</li> <li>3. Describe cold chain and its importance</li> <li>4. Explain Value addition of harvested produce</li> <li>5. Describe Post-harvest losses</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstrate the process of grading of produce</li> <li>2. Demonstrate the process of packaging and storage of produce</li> </ol>	35
<b>Total</b>			<b>40</b>

<b>Unit 3: Basic marketing activities for small enterprise</b>			
<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (15 hrs)</b>	<b>Duration (25 hrs)</b>
1. Classify of markets and marketing channels	<ol style="list-style-type: none"> <li>Describe market and its components</li> <li>Classification of Market</li> <li>Marketing channels</li> </ol>	<ol style="list-style-type: none"> <li>Enlist the different types of market and marketing channels</li> </ol>	10
2. Describe the process of marketing the produce	<ol style="list-style-type: none"> <li>Explain how to analyse the demand and supply of the agricultural produce</li> <li>Explain how to collect information related to the wholesale and retail price of agricultural produce</li> <li>Describe the relevant government schemes and other financial institutions for setting up the Hydroponic units</li> <li>Explain the use of the relevant digital services such as e-commerce, e-payments, electronic record keeping, etc.</li> </ol>	<ol style="list-style-type: none"> <li>Visit nearby market, observe and note down the different aspect of marketing</li> <li>Enlist different government scheme and financial institutions for establishment of hydroponic system</li> </ol>	15
<b>Total</b>			<b>25</b>

<b>Unit 4: Hygiene, cleanliness, safety and emergency procedures</b>			
<b>Learning Outcome</b>	<b>Theory (10 hrs)</b>	<b>Practical (35 hrs)</b>	<b>Duration (45 Hrs)</b>
1. Demonstrate safe use of agrochemicals	<ol style="list-style-type: none"> <li>Describe harmful effects of agrochemicals</li> <li>Methods of safe use of agrochemicals</li> <li>Cleaning and Disposal of empty pesticides containers</li> </ol>	<ol style="list-style-type: none"> <li>Demonstration of safe use of agrochemicals</li> </ol>	10
2. Demonstrate First Aid, Treatment and Safety Equipment	<ol style="list-style-type: none"> <li>Describe common health and safety guidelines to be followed at the workplace</li> <li>Chemical poisoning and first aid measures</li> <li>Treatment for simple chemical poisoning</li> <li>Safety and protective Equipment</li> <li>Emergency response</li> <li>Health and safety awareness at work place</li> </ol>	<ol style="list-style-type: none"> <li>Identification of the components of first aid kit</li> <li>Identification of safety and protective devices</li> <li>Demonstrate Use of safety and protective devices</li> </ol>	20
3. Safe use of agricultural machinery	<ol style="list-style-type: none"> <li>Checking the tools and machinery before use</li> <li>Safety precautions taken during use of agricultural machinery</li> <li>Daily/periodic</li> </ol>	<ol style="list-style-type: none"> <li>Demonstration of general inspections for use of machinery</li> <li>Demonstration of precautions taken during use of</li> </ol>	15

	mandatory inspections of machinery 4. Protective measures during operating machinery	agricultural machinery	
<b>Total</b>			<b>45</b>

## 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 nearby hydroponics unit and observe the following: Location, Site, area, types of hydroponic system, infrastructure, equipments used, Office building, Store, Pot yard, Packing Yard, Seed bed, Nursery bed, Water tank, Gate and fencing. During the visit, students should obtain the following information from the owner or the supervisor of the nursery:

1. Area under hydroponics and its layout
2. Types of hydroponic system used
3. Types of plants/ crops raised
4. Methods of propagation adopted
5. Whether plants raised by micropropagation
6. Number of crops grow annually
7. Quantity of produce sold annually
8. Sale procedure
9. Manpower engaged
10. Total expenditure in construction of hydroponic unit
11. Fertigation unit
12. Total annual income
13. Profit/Loss (Annual)
14. 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. Green house/ Hydroponics Unit
2. Growing chamber
3. Reservoir/ Water tank
4. EC meter
5. pH meter
6. Submersible pump
7. Delivery system
8. Simple timer
9. Nutrient pump/ Fertigation Unit
10. Air pumps
11. Grow lights
12. Transplanting trowel
13. Secateur
14. Water can

15. Pruning knife
16. Super cut
17. Seed boxes
18. Thinning scissor
19. Hand cultivator
20. Hand weeder
21. Weeding fork
22. Plastic applicators
23. Plastic recipients
24. Small Trowel
25. Rake
26. Sprayer
27. Duster
28. Mobile benches,
29. Thermometer
30. Lux meter/Light meter
31. Misting
32. Digital electronic temperature indicator
33. Radiation measuring instrument
34. Temperature & humidity control system
35. Automatic shade system
36. Fogging and blackout
37. Drip and sprinkler system
38. Fan
39. Pad
40. Ventilator
41. Hygrometer

- **List of Chemicals**

42. Liquid fertilizer
43. Growing medium (Cocopeat, Vermiculite, perlite etc.)
  - a. Formalin
  - b. Sulphur
  - c. Insecticide
  - d. Fungicide
  - e. Plant Growth regulator/ hormones

## 8. VOCATIONAL TEACHERS/ TRAINERS 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 follows:

S. No.	Qualification	Minimum Competencies	Age Limit
1.	Post-graduation in Agriculture from a recognized Institute/University, with at least 1 year work experience in relevant field.	<ul style="list-style-type: none"> <li>• Effective communication skills (oral and written)</li> <li>• Basic computing skills.</li> </ul>	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 Samagra Shiksha. They are directly involved in teaching of vocational subjects and also serve as a link between the 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 following 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 Skill Council (SSC)

OR

- (ii) Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF\*) approved by the National Skill 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 National Quality Assurance Framework (NQAF) provides the benchmarks or quality criteria which the different organisations involved in education and training must meet in order to be accredited by competent bodies to provide government-funded education and training/skills activities. This is applicable to all organizations offering NSQF-compliant qualifications.*

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 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 Skill Council for the particular Qualification Pack/ Job role which he will 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 followed. The selection procedure should consist of the following:

- (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 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 skill 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 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 annually. Performance based appraisal in relation to certain pre-established criteria and objectives should be done periodically to ensure the quality of the Vocational Teachers/Trainers. Following parameters may be considered during the appraisal process:

1. Participation in guidance and counselling 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 skills related to the vocational pedagogy, communication skills 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;
10. Organisation of activities for promotion of vocational subjects;
11. Involvement in placement of students /student support services.

## 9. LIST OF REFERENCE BOOK

- Hasan, M., Sabir, N.M., Singh, A. K., Singh, M.C., Patel, N., Khanna, M., Rai, T. and Pragnya, P. (2018). Hydroponics Technology for Horticultural Crops, Tech. Bull. TB-ICN 188/2018. Publ. by I.A.R.I., New Delhi-110012 INDIA Pp. 30.

- Sanjay Misra, Sanyat Misra and R. L. Misra (2022). Soilless Crop Production. Daya Publishing House, New Delhi

## 10. LIST OF CONTRIBUTORS

---

### **Sl. No. Name and address of expert**

1. Dr. Rajiv Kumar Pathak, Professor and Head, Department of Agriculture and Animal Husbandry, PSSCIVE, NCERT, Shyamla Hills, Bhopal, Madhya Pradesh
2. Dr. Archit Singh, Assistant Professor (Contractual), Department of Agriculture and Animal Husbandry, PSSCIVE, NCERT, Shyamla Hills, Bhopal, Madhya Pradesh
3. Dr. Ankita Sharma, Assistant Professor (Contractual), Department of Agriculture and Animal Husbandry, PSSCIVE, NCERT, Shyamla Hills, Bhopal, Madhya Pradesh
4. Mr. Aman Kumar, Assistant Professor (Contractual), Department of Agriculture and Animal Husbandry, PSSCIVE, NCERT, Shyamla Hills, Bhopal, Madhya Pradesh

## 11. LIST OF REVIEWERS

---

### **Sl. No. Name and address of expert**

1. Dr. S. R. Singh, Principal Scientist, ICAR- Central Institute for Subtropical Horticulture, Lucknow, Uttar Pradesh
2. Dr. Maharaj Singh, Principal Scientist, ICAR-Central Arid Zone Research Institute, Jodhpur, Rajasthan
3. Dr. S. K. Pande, Director, School of Agriculture Science, LNCT University, Bhopal, Madhya Pradesh
4. Dr. Devesh Pandey, Associate Professor, Mansarovar Global University, Bhopal, Madhya Pradesh

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी  
NCERT

**PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION**  
Shyamla Hills, Bhopal- 462 002, M.P., India