LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE: Microirrigation Technician

(QUALIFICATION PACK: Ref. Id. AGR/Q1002)

SECTOR: Agriculture

Classes 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

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

Shyamla Hills, Bhopal- 462 013, 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.

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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 Centrally 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 competency 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 Microirrigation Technician. The curriculum has been developed for the higher secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

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 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 will 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 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. The much-discussed demographic dividend will bring sustaining benefits only if this young workforce is skilled and its potential is channelized in the right direction.

In order to fulfil the growing aspirations of our youth and the demand of skilled human resource, the Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally 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 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 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 skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfil the needs of the society and the world of work. In order to honour its commitment to the nation, the PSSSCIVE 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 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 all 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 modular 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.

Finally, for transforming the proposed curriculum design into a vibrant reality of implementation, all the institutions involved in the delivery system shall 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 will 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 will 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 learning outcome based 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 RMSA, MHRD, RMSA 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 course coordinator Vinay Swarup Mehrotra for his untiring efforts and contributions in the development of this learning outcome based curriculum. The contributions of Ranjeet Singh Chaudhari, Ph.D., Principal Scientist, Indian Institute of Soil Science (IISS), Bhopal is thankfully 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 Cell (PPMC) and Dipak Shudhalwar, Associate Professor, Department of Engineering and Technology, PSSCIVE in the development of the curriculum for employability skills are duly acknowledged.

The assistance provided by Sunita Koli, Computer Operator Grade III, Piyush Deorankar, Computer Operator (on contract) and Ishrat Khan, Computer Operator (on contract) in typing and composing of the material is duly acknowledged.

PSSCIVE Team

CONTENTS

1. COURSE OVERVIEW

COURSE TITLE: Agriculture – Microirrigation Technician

Microirrigation Technician performs the task of designing the micro-irrigation system, procuring the materials required for building the irrigation system, installing, testing and commissioning the micro-irrigation system in the farm, training the farmers to use the irrigation system, ensuring uninterrupted water supply to the plants in the farm, troubleshooting the problems which occur at the farm, maintaining the micro-irrigation system.

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 and abilities;
- ☐ Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
- ☐ Demonstrate the knowledge of processes and preparations involved in the basic agricultural practices for production of different crops in different seasons;
- ☐ Design the micro-irrigation system;
- ☐ Procure the materials required for setting up the microirrigation system;
- ☐ Install, test and commission the micro-irrigation system in the farm;
- ☐ Train the farmers to use the irrigation system;
- ☐ Troubleshoot the problems with the microirrigation system at the farm;
- ☐ Demonstrate the knowledge of the design, operation and maintenance of drip and sprinkler irrigation system in different crops;

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

COURSE LEVEL: On completion of this course, a student can take up a course for a job role in Agriculture.

COURSE DURATION: **600 hrs**

Class 11	:	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 follows:

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	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Introduction to Microirrigation System	45	
	Unit 2: Layout and Installation of Sprinkler Irrigation system	65	
	Unit 3: Maintenance of Sprinkler Irrigation System	55	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Grand Total	**300**	**100**

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

CLASS 12			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	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	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Layout and Installation of Microirrigation System	75	
	Unit 2: Maintenance of Drip Irrigation System	70	
	Unit 3: Occupational Health, Hygiene and First Aid Practices	20	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Grand Total	**300**	**100**

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 or teaching 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. ASSESSMENT AND CERTIFICATION

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

It 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 **Maximum Marks: 40**

		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 and 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 (20 questions)**

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.

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.

5. UNIT CONTENTS

CLASS 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
	Total	**110**

UNIT 1: COMMUNICATION SKILL – III			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (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
2. 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
Total			**25**

UNIT 2: SELF-MANAGEMENT – 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

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
Total			**25**

UNIT 3: INFORMATION and COMMUNICATION TECHNOLOGY - 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 2. Using autocorrect option 3. Insert page numbers and bullet 4. Save and print a document	10
Total			**20**

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
Total			**25**

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
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			**15**

Part B: Vocational Skills

S.No.	Units	Duration (Hrs)
1.	Introduction to Microirrigation System	45
2.	Layout and Installation of Sprinkler Irrigation system	65
3.	Maintenance of Sprinkler Irrigation System	55
	Total	**165**

UNIT 1: INTRODUCTION TO MICROIRRIGATION SYSTEM			
Learning Outcome	**Theory (20 Hrs)**	**Practical (25 Hrs)**	**Duration (45 Hrs)**
1. Demonstrate the knowledge of the importance of microirrigation system	1. Introduction to microirrigation system 2. Classification of micro irrigation system 3. Types of drip irrigation system 4. Types of Sprinkler irrigation system 5. Advantages of micro irrigation system – in case of water scarcity, climate change, increase use efficiency	1. Visit to a an agricultural farm to study the various components of flood irrigation system and microirrigation system 2. Group discussion on the volume loss beyond root zone 3. Discussion on the Infiltration rate of the soil and factors	15

	of water, limited water resource, etc.	affecting infiltration rate	
2. Identify land gradient and crops	3. Characteristics of land gradient and crops	1.Visit to a an agricultural farm to study the land gradient and the crops grown under micro irrigation system	10
3. Design the suitable micro irrigation system in the field	1. Design of the micro irrigation system in the field	1. Visit to a an agricultural farm to study the design of the micro irrigation system in the field 2. Development of an artificial model to demonstrate the design of a micro irrigation system	20
Total			**45**

UNIT 2: LAYOUT AND INSTALLATION OF SPRINKLER IRRIGATION SYSTEM			
Learning Outcomes	**Theory (25 Hrs)**	**Practical (40 Hrs)**	**Duration (65 Hrs)**
1. Identify components of Sprinkler Irrigation System (SIS)	1. Components of Sprinkler Irrigation System	1. Visit to a an agricultural farm to study the various components of Sprinkler Irrigation System	05
3. Identify tools and materials used for installation of Sprinkler irrigation system.	1. Different tools and materials used for installation of sprinkler irrigation system (Pipe Wrench, Spanner Set, ,Drill machine, Drill guide, Screw Driver, Pliers, Hack Saw Blade with Frame, Measuring Tape, Punch, Take off tool, Solvent cement, Teflon tape, Jute, GI threaded joint's synthetic compound, Pencil / marker, Hot plate)	1. Identification of different tools, such as Pipe wrench, Spanner set (preferably adjusting pipe wrench), Pliers, Hack Saw Blade with frame, Screw driver, Drill machine with units of different sizes	05

2. Identify colour codes, symbols and SI units from given document	1. Colour codes 2. SI units 3. Symbols used in installation of a microirrigation system	1. Identification of electrical colours codes and symbols 2. Discussion on SI Units and SI derived units – names and symbols	10
4. Computation of head and power requirement of pump	1. Principles of computation of head and power requirement of pump	1. Exercises on different head situation and calculation of power requirements of pumps	10
5. Perform prerequisite checks while installing Sprinkler Irrigation System	1. Prerequisite checks to be performed during installation of Sprinkler Irrigation System	1. Visit to a farm for installation of sprinkler irrigation system. (i) Check whether the physical situation on site meets with the dimensions mentioned in design. (ii) Check whether the installation work as per the installation guidelines and system/product specifications (iii) Check whether the design for appropriate number of sprinkler nozzles for designed pitch is ready (iv) Check all the tools required for installation are available (v) Check if the trenching is ready as per design/drawing and to the required specifications. (vi) Check all the required material and fittings are available vii) Check for Pump set connection and availability of required fittings for head unit.	25
6. Install pipe networks (mains and sub-mains) with risers	1. Procedures and materials involved in installation of pipe network	1. Demonstration of procedure adopted for installation of pipe network	05

		2. Preparation of trenches, laying of PVC pipes, installation of valves and installation of laterals	
7. Post Installation checks	Precaution of Various post installation checks performed and precautions to be adopted while performing them	1. Identification of the post installation checks and precautions adopted while performing them	05
Total			**65**

UNIT 3: MAINTENANCE OF SPRINKLER AND DRIP IRRIGATION SYSTEM			
Learning Outcome	**Theory (20 Hrs)**	**Practical (35 Hrs)**	**Duration (55 Hrs)**
1. Operate and monitor Sprinkler Irrigation System	1. Sequence of operation- pump, NRV, air release valve, main and sub main valves, lateral and sprinklers	1. Demonstration of operation of Sprinkler Irrigation System	15
2. Maintenance of Sprinkler Irrigation System	1. Key operating parameters to monitor the Sprinkler Irrigation System - mid-term correction to avoid extra overlapping	1. Identification and monitoring of key performances in SIS 2. Monitor for differences in system pressure, extra overlapping, flow, monitor laterals, flush water gravity, monitor for mechanical damage, leakage, etc.	20
3. Maintain the pump, filter and hydro-cyclone valves	1. Procedure for maintenance of Head unit, pump, filter, and hydro-cyclone valves	1. Demonstration and maintenance of pump, hydro-cyclone, filters, valves, etc.	10
4. Maintain the distribution network and sprinkling devices	1. Procedure for maintenance of distribution network and sprinklers	1. Demonstration of maintenance of distribution network, system flushing, periodic maintenance, and sprinkler nozzle maintenance	10
Total			**55**

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
Total			**25**

UNIT 2: SELF-MANAGEMENT SKILLS – 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); 2. Finding sources of motivation and inspiration (music, books, activities);expansive thoughts; living fully in the present moment; dreaming big	1.Group discussion on identifying needs and desire 2. Discussion on sources of motivation and inspiration	10
2. Describe the basic personality	1. Describe the meaning of personality	1. Demonstrate the knowledge of different personality types	15

traits, types and disorders	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		
Total			**25**

UNIT 3: INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS - IV			
Learning Outcome	**Theory (06 hrs)**	**Practical (14 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
2. Prepare presentation using presentation application	1. Introduction to presentation 2. Software packages for presentation 3. Creating a new presentation 4. Adding a slide	1. Demonstration and practice on the following: • Listing the software packages for presentation	10

	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.	• 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	
Total			**20**

UNIT 4: ENTREPRENEURIAL SKILLS - IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 Hrs)**
1. Identify 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. Demonstrate the knowledge of self-assessment of behavioural competencies	1. Entrepreneurial competencies in particular: self - confidence, initiative, seeing and acting on opportunities, concern for quality, goal setting and risk taking, problem solving and creativity, systematic planning and efficiency, information seeking, persistence, influencing and negotiating, team building	1. Games and exercises on changing entrepreneurial behaviour and development of competencies for enhancing self-confidence, problem solving, goal setting, information seeking, team building and creativity	15
		Total	**25**

UNIT 5: GREEN SKILLS - IV			
Learning Outcome	**Theory (05 hrs)**	**Practical (10 hrs)**	**Duration (15 Hrs)**
1. Identify the role and importance of green jobs in different sectors	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			**15**

Part B–Vocational Skills

S.No.	Units	Duration (Hrs)
1.	Layout and Installation of Microirrigation System	75
2.	Maintenance of Drip Irrigation System	70
3.	Occupational Health, Hygiene and First Aid Practices	20
	Total	**165**

UNIT 1: LAYOUT AND INSTALLATION OF MICROIRRIGATION SYSTEM			
Learning Outcome	**Theory (25 hrs)**	**Practical (50 hrs)**	**Duration (75 Hrs)**
1. Identify components of microirrigation system	1. Components of microirrigation system	1. Identification of various components of microirrigation system	05
2. Identify different parts of microirrigation unit	1. Parts of micro-irrigation unit	1. Identification of various parts of the microirrigation unit	05
3. Identify tools and materials used for installation of drip irrigation system	1. Tools and materials used for installation of drip irrigation system	1. Identification of different tools such as Pipe Wrench, Spanner Set (preferably adjusting sly wrench), Drill machine with drill bits of different sizes, Drill guide, Screw Driver, Pliers, Hack Saw blade with frame, Measuring Tape, Punch, Take off tool, Solvent cement, Teflon tape, Jute, GI threaded joint's synthetic compound, Pencil / marker, Hot plate	10
4. Perform prerequisite checks while installation of drip irrigation system	2. Prerequisite checks to be performed during installation of Drip irrigation system	1. Visit to a farm for installation of sprinkler irrigation system i. Check whether the physical situation on site meets with the dimensions mentioned in design ii. Do the installation work as per the installation guidelines and system/product specifications only.	25

UNIT 1: LAYOUT AND INSTALLATION OF MICROIRRIGATION SYSTEM			
Learning Outcome	**Theory (25 hrs)**	**Practical (50 hrs)**	**Duration (75 Hrs)**
		iii. Check whether the design for appropriate number of sprinkler nozzles for designed pitch is ready iv. Check all the tools required for installation are available v. Check if the trenching is ready as per design/drawing and to the required specifications. vi. Check all the required material and fittings are available vii. Check for Pump set connection and availability of required fittings for head unit	
5. Install Head Unit	1. Procedure for installation of Head Unit	1. Identification of the tools and materials used for installation of Head unit such as: Pumping Unit, Bypass Mechanism, Non-Return Valve, Hydro-cyclone Filter, Fertigation unit, Sand filter, Screen/Disc Filter, Sub-main and Mainline Connections	10
6. Install Pipe Networks	2. Procedures and materials involved in installation of pipe network	3. Demonstration of procedure adopted for installation of pipe network: 4. Preparation of trenches, Laying of PVC pipes, Installation of Valves, Installation of Laterals	10
7. Install the water Emitters/ drippers	1. Procedures, methods and precautions adopted for installation of emitters/ drippers	1. Demonstration of the installation of emission devices	05

UNIT 1: LAYOUT AND INSTALLATION OF MICROIRRIGATION SYSTEM			
Learning Outcome	**Theory (25 hrs)**	**Practical (50 hrs)**	**Duration (75 Hrs)**
8. Post check of installation	2. Various post installation checks performed and precautions to be adopted while performing them	3. Identification of the post installation checks and precautions adopted while performing them	05
Total			**75**

UNIT 2: MAINTENANCE OF DRIP IRRIGATION SYSTEM			
Learning Outcome	**Theory (25 hrs)**	**Practical (45 hrs)**	**Duration (70 Hrs)**
1. Operate drip irrigation system	1. Sequence of operation of drip irrigation system: a) Pump b) Bye-pass valve c) Filters d) Fertigation unit e) Main and sub-main valves f) Laterals and emitters	1. Demonstration of operation of drip irrigation system	25
2. Monitor drip irrigation system	1. Key operating parameters to monitor drip irrigation system	1. Identification and monitoring of key parameters in drip irrigation system 2. Monitoring for differences in system pressure flow 3. Monitoring lateral flush 4. Monitoring water quality 5. Monitoring for mechanical damage	10
3. Maintain the Head Unit	1. Procedure for maintenance of Head Unit	1. Demonstration of maintenance of head unit: maintenance of hydro-cyclone filters, maintenance of sand / media filters, maintenance of screen filter, maintenance of disc filter	10
4. Maintain the distribution network	1. Procedure for maintenance of	1. Visit to a farm for demonstration of	25

UNIT 2: MAINTENANCE OF DRIP IRRIGATION SYSTEM			
Learning Outcome	**Theory (25 hrs)**	**Practical (45 hrs)**	**Duration (70 Hrs)**
and emission devices	distribution network and emission devices	maintenance of distribution network and emission devices, system flushing, daily, weekly or fortnightly periodic maintenance, emitter's maintenance, etc.	
Total			**70**

UNIT 3: OCCUPATIONAL HEALTH, HYGIENE AND FIRST AID PRACTICES			
Learning Outcome	**Theory (10 Hrs)**	**Practical (10 Hrs)**	**Duration (20 Hrs)**
1. Recognize and adopt strategies for preventing hazardous conditions and work practices	1. Types of hazards 2. Common hazards at agriculture farm 3. Principles of safety and health 4. Procedure and steps to be taken to report any accident, incident or problem without delay to an appropriate person 5. Applicable hygiene and safety standards/ regulations	1. Reading of the manuals for tools, equipment and materials used in installation of microirrigation systems 2. Demonstration of the correct and safe use of tools, equipment and materials 3. Discussion on the procedure for reporting any accident, incident or problem without delay to an appropriate person and taking action to reduce further danger	10
2. Administer first aid or undertake most important action in a life-threatening emergency	1. Procedure for providing first aid in case of medical emergency – cut, burns, bites, grazes, bruises, electric shock, external bleeding, etc.	1. Demonstration of basic first aid practices adopted for cut, burns, snake bites, grazes, bruises, external bleeding, dog bites, bee bites, and other injuries 2. Demonstration of first aid care for a conscious and an unconscious victim with an obstructed airway	6

UNIT 3: OCCUPATIONAL HEALTH, HYGIENE AND FIRST AID PRACTICES			
Learning Outcome	**Theory (10 Hrs)**	**Practical (10 Hrs)**	**Duration (20 Hrs)**
3. Undertake physical and biological methods of treating waste materials	1. Procedure for treating waste materials using physical and biological methods	1. Disposing waste safely and correctly in a designated area	4
Total			**20**

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 an agricultural field with microirrigation system installed in it. During the visit, students should obtain the following information from the owner or the supervisor of the farm:

1. Area under microirrigation system
2. Layout of the microirrigation system
3. Plants raised
4. Manpower engaged
5. Operation and maintenance of microirrigation system
6. Total expenditure incurred in installation
7. Any other information

7. LIST OF EQUIPMENT AND MATERIALS

The tools, equipment and materials required for training are quite expensive, therefore, 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. A micro-irrigation kit may be procured for training and regular field visits should be organised to provide opportunities to the students/trainees for observation and hands-on practice.

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 follows:

S.No.	Qualification	Minimum Competencies	Age Limit
1.	Post-graduation in Horticulture from a recognized Institute /University, with at least	• Effective communication	18-37 years (as on Jan. 01 (year))

	1 year work/ teaching experience	skills (oral and written) • Basic computing skills.	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 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 CONTRIBUTORS

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