

**LEARNING OUTCOME
BASED
VOCATIONAL
CURRICULUM**

JOB ROLE: Mushroom Grower

(QUALIFICATION PACK: Ref. Id. AGR/Q7803)

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- 462 002, 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

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LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

Agriculture – Mushroom Grower

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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 Central y Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education (CSSVSHSE) launched by the Ministry of Human Resource Development, Government of India in 2012. The PSS

Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *Rashtriya Madhyamik Shiksha Abhiyan* (RMSA). The main

purpose of the 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 Mushroom Grower. 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

(i)

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 PSSCIVE has initiated the work on developing learning outcome based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and 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 Shiksha Abhiyan* (RMSA) of MHRD.

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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

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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 contribution of D. L.

N. Rao, Ph.D., Emeritus 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.

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PSSCIVE Team

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1. COURSE OVERVIEW

COURSE TITLE: Agriculture – Mushroom Grower

A Mushroom Grower has to plan and organise activities which include acquiring or preparing spawn and substrate, packing substrate in plastic bags or trays, inoculating the substrate with spawn, incubation, picking or harvesting mushrooms, processing, storing, packing and marketing.

COURSE OUTCOMES: On completion of the course, student 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 the various types of commonly cultivated edible mushrooms and their economic importance

- Distinguish between button, oyster and paddy straw mushrooms, based on their physical characteristics.
- Explain the influence of factors like temperature, humidity and carbon dioxide on the growth and development of mushrooms.
- Select a mushroom species for cultivation.
- Distinguish between a seasonal cropping room and environment controlled cropping room.
- Identify, operate and maintain the various tools and equipment for mushroom cultivation.
- Demonstrate the knowledge of composting.
- Distinguish between various pests and diseases of mushrooms.
- Apply appropriate control measures for controlling pests and diseases of mushrooms.
- Prepare and apply casing material.
- Demonstrate the knowledge of bed preparation and spawning for mushroom production.
- Monitor and maintain environmental conditions for cropping in mushroom.
- Demonstrate hygienic and safe work practices in bed preparation, spawning and crop management.
- Harvest mushrooms with minimal damage.
- Pack fresh mushrooms and store them at appropriate temperature.
- Collect and record information.

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 Horticulture.

COURSE DURATION:

600 hrs

Class 11: 300 hrs

Class 12: 300 hrs

Total : 600 hrs

2. SCHEME OF UNITS AND ASSESSMENT

CURRICULUM: AGRICULTURE –MUSHROOM GROWER

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This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Class 9 and 10 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 Mushroom	50	40
	Unit 2: Compost Making for Oyster Mushroom	75	
	Unit 3: Mushroom Production	40	
	Total	165	
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	20	10
	Unit 2: Self-management Skills – IV	10	
	Unit 3: Information and Communication Technology Skills – IV	20	
	Unit 4: Entrepreneurial Skills – IV	15	
	Unit 5: Green Skills – IV	10	
	Total	75	10
Part B	Vocational Skills		
	Unit 1: Management of Diseases and Pests	50	

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 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 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
1. Identify specific communication styles	1. Communication styles- assertive, aggressive, passive-aggressive, submissive, etc.	1. Observing and sharing communication styles of friends, teachers and family members and adapting the best practices 2. Role plays on communication styles.	10
3. Demonstrate basic writing skills	1. Writing skills to the following: • Sentence • Phrase	1. Demonstration and practice of writing sentences and paragraphs on topics related to the subject	10

	<ul style="list-style-type: none"> • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph 		
Total			25

UNIT 2: SELF-MANAGEMENT - III			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Demonstrate impressive appearance and grooming	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 1. Demonstration of impressive appearance and groomed personality 2. Demonstration of the ability to self- explore 	10
2. Demonstrate team work skills	<ol style="list-style-type: none"> 1. Describe the important factors that influence in team building 2. Describe factors influencing team work 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Introduction to word processing. 2. Software packages for word processing. 3. Opening and exiting the word processor. 4. Creating a document 	<ol style="list-style-type: none"> 1. Demonstration and practice of the following: <ul style="list-style-type: none"> • Listing the features of word processing • Listing the software packages for word processing • Opening and exit the word processor • Creating a document 	10

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	<ol style="list-style-type: none"> 1. Values in general and entrepreneurial values 2. Entrepreneurial value orientation with respect to innovativeness, independence, outstanding performance and respect for work 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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)

UNIT 1: INTRODUCTION TO MUSHROOMS			
Learning Outcome	Theory (20 Hrs)	Practical (30 Hrs)	Duration (50 Hrs)
	scale of mushroom production	need to be considered while taking a decision on the scale of mushroom production	
3. Identify the various components of mushroom production unit	1. Components of mushroom production unit	1. Visit to a mushroom production unit to study the structures and design of the various components of the unit, such as cropping room, etc.	15
Total			50

UNIT 2: COMPOST MAKING FOR OYSTER MUSHROOM			
Learning Outcome	Theory (30 Hrs)	Practical (45 Hrs)	Duration (75 Hrs)
1. Identify the materials used for preparing compost	1. Types of raw materials required for preparing compost	1. Identification of different types of materials used for preparing compost e.g., paddy straw, wheat straw, mustard straw, urea, etc.	10
2. Identify the containers used for making and filling compost	2. Containers used for mushroom production – trays, bags, etc.	1. Identification of containers used for mushroom production	05
3. Differentiate between the short and long duration methods of composting	1. Methods of composting – short and long duration method	1. Visit to a Mushroom Production Unit for demonstration of short and long methods of composting	10
4. Prepare natural compost	1. Types of compost – natural and artificial	1. Preparation of natural compost	10
5. Prepare artificial compost	1. Procedure for preparing artificial compost	1. Preparation of artificial compost	10
6. Pasteurize compost	1. Pasteurization of compost to kill insects, nematodes, pest fungi, or other pests	1. Demonstration of the method of pasteurization of compost	10
7. Test the readiness of compost	1. Testing of the readiness of compost -palm or squeeze test, pH test, etc.	1. Demonstration of the testing of the readiness of compost	10
8. Dispose the wastes materials in accordance with environmental health and safety guidelines	1. Procedure for disposal of wastes materials in accordance with environmental health and safety guidelines	1. Demonstration of the procedure adopted for disposal of wastes materials in accordance with environmental health and safety guidelines	10
Total			75

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	1. Preparing a poster on any one of the sectors of green economy 2. Writing a two- -----	08
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	water management 2. Policy initiatives for greening economy in India	page essay on important initiatives taken in India for promoting green economy	
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 Mushrooms	50
2	Compost Making for Mushrooms	75
3	Mushroom Production	40
Total		165

UNIT 1: INTRODUCTION TO MUSHROOMS

Learning Outcome	Theory (20 Hrs)	Practical (30 Hrs)	Duration (50 Hrs)
1. Identify different types of mushroom and environmental factors affecting their production and yield	1. Types of mushrooms 2. Basics of mushroom production 3. Environmental factors affecting mushroom production and yield	1. Identification of different types of mushroom 2. Distinguishing between edible and poisonous mushrooms 3. Visit to mushroom production unit to identify edible mushrooms	15
2. Identify the scale of mushroom production	1. Scales of mushroom production - marginal scale, small scale and industrial scale 2. Factors influencing the decision of the	1. Visit to mushroom production unit to understand the scale and the requirements of production 2. Listing of factors that	20

UNIT 3: MUSHROOM PRODUCTION			
Learning Outcome	Theory (15 Hrs)	Practical (25 Hrs)	Duration (40 Hrs)
1. Identify the various requirements for mushroom production	1. Components of a mushroom production unit – composting yard cemented drains, cropping unit/shed, pasteurization tunnel, etc. 2. Requirements for mushroom production	1. Visit to a mushroom production unit for identification of factors that needs to be considered for mushroom production 2. Discussion on issues and challenges in mushroom production	10
2. Identify the stages in mushroom production	1. Stages in mushroom production - spawn production, compost production, spawning, caring harvesting	1. Identification of stages of mushroom production 2. Discussion on the growth of mushroom and the importance of hygiene in mushroom production	10
3. Methods of spawning	1. Methods of spawning – top spawning, double layer spawning, through spawning, and spot spawning	1. Demonstration of various types of spawning	10
4. Measure and record pH, temperature and humidity	1. Environmental factors affecting mushroom production 2. Procedure for measuring and recording pH, temperature and humidity	1. Demonstration of use of equipment for measuring pH, temperature and humidity 2. Demonstration of the procedure of measuring and recording pH, temperature and humidity	10
Total			40

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	1. Demonstration of the key aspects of becoming active listener	10

	listening	2. Preparing posters of steps for active listening	
2. Demonstrate basic writing skills	2. Writing skills to the following: <ul style="list-style-type: none"> • 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 traits, types and disorders	1. Describe the meaning of personality 2. Describe how personality influence others 3. Describe basic personality traits 4. Describe common personality disorders- paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive	1. Demonstrate the knowledge of different personality types	15
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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Demonstration and practice on the following: <ul style="list-style-type: none"> • 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	<ol style="list-style-type: none"> 1. Introduction to presentation 2. Software packages for presentation 3. Creating a new presentation 4. Adding a slide 5. Deleting a slide 6. Entering and editing text 7. Formatting text 8. Inserting clipart and images 9. Slide layout 10. Saving a presentation 11. Printing a presentation document. 	<ol style="list-style-type: none"> 1. Demonstration and practice on the following: <ul style="list-style-type: none"> • Listing the software packages for presentation • Explaining the features of presentation • Creating a new presentation • Adding a slide to presentation. • Deleting a slide • Entering and edit text • Formatting text • Inserting clipart and images • Sliding layout • Saving a presentation • Printing a presentation document 	10
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	<ol style="list-style-type: none"> Barriers to becoming entrepreneur Behavioural and entrepreneurial competencies – adaptability/ decisiveness, initiative/perseverance, interpersonal skills, organizational skills, stress management, valuing service and diversity 	<ol style="list-style-type: none"> Administering self- rating questionnaire and score responses on each of the competencies Collect small story/ anecdote of prominent successful entrepreneurs Identify entrepreneurial competencies reflected in each story and connect it to the definition of behavioural competencies Preparation of competencies profile of students 	10
2. Demonstrate the knowledge of self-assessment of behavioural competencies	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> Role of green jobs in toxin-free homes, Green organic gardening, public transport and energy conservation, Green jobs in water conservation Green jobs in solar and wind power, waste reduction, reuse and recycling of wastes, Green jobs in green tourism Green jobs in building and construction Green jobs in appropriate technology Role of green jobs in Improving energy and raw materials use Role of green jobs in limiting greenhouse gas emissions Role of green jobs 	<ol style="list-style-type: none"> Listing of green jobs and preparation of posters on green job profiles Prepare posters on green jobs. 	15

	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		
Total			15

Part B–Vocational Skills

S.No.	Units	Duration (Hrs)
1.	Management of diseases and pests of mushrooms	75
2.	Harvesting, Processing and Marketing of Mushrooms	40
3.	Preparing a Business Plan for Mushroom Production Unit	50
Total		165

UNIT 1: MANAGEMENT OF DISEASES AND PESTS OF MUSHROOMS			
Learning Outcome	Theory (30 hrs)	Practical (45 hrs)	Duration (75 Hrs)
1. Sterilise the casing soil and dispose the spent compost to control nematodes, mites, insect pests, etc.	1. Casing soil and disposing spent compost 2. Methods of disposing of waste materials for prevention of spread of nematodes, mites, insect pests, etc.	1. Demonstration of sterilization of casing soil 2. Demonstration of proper disposal of spent compost to control nematodes, mites, insect pests, etc.	20
2. Prepare the casing material	1. Procedure for preparing casing material	1. Preparation of casing material	15
3. Sterilize the casing material	1. Procedure of sterilizing casing material	1. Demonstration of sterilisation of casing material - steam pasteurisation, chemical treatment (use of formaldehyde)	05
4. Apply the casing material	1. Procedure for application of casing material	1. Demonstration of application of casing material	05
5. Identify the stages of pinning	1. Stages of pinning	1. Identification of stages of pinning	05
6. Identify the stages of cropping	1. Stages of cropping	1. Identification of stages of cropping	05
7. Identify the fungicides used to control major fungal pathogens	1. Fungicides used for controlling the diseases of mushrooms	1. Demonstration of use of fungicides to control major fungal pathogens	05
8. Undertake the of control measures to prevent contamination of	1. Control measures to prevent contamination 2. Pests and diseases of mushroom	1. Demonstration of control measures to prevent contamination of the mushroom	15

UNIT 1: MANAGEMENT OF DISEASES AND PESTS OF MUSHROOMS			
Learning Outcome	Theory (30 hrs)	Practical (45 hrs)	Duration (75 Hrs)
the mushroom	3. Common disorders in mushrooms 4. Staking of trays for preventing contamination, etc.		
Total			75

UNIT 2: HARVESTING, PROCESSING AND MARKETING OF MUSHROOMS			
Learning Outcome	Theory (10 hrs)	Practical (30 hrs)	Duration (40 Hrs)
1. Identify the stages of harvesting mushroom	1. Stages of mushroom 2. Methods of harvesting mushroom	1. Identification of stages of harvesting mushroom	10
2. Packaging of mushroom	1. Materials used for packaging of mushroom 2. Procedure for packing mushrooms	1. Demonstration of the procedure for packaging of mushroom 2. Demonstration of the procedures to be adopted for maintaining hygienic condition during packaging	10
3. Grading of mushroom	1. Grades of mushroom	1. Demonstration of sorting of mushroom as per the grades.	10
4. Demonstrate the knowledge of factors affecting the marketability of mushrooms	2. Marketability of mushrooms	2. Demonstration of the procedure for assessment of marketability of mushrooms	10
Total			40

UNIT 3: PREPARING A BUSINESS PLAN FOR MUSHROOM PRODUCTION			
UNIT			
Learning Outcome	Theory (20 hrs)	Practical (30 hrs)	Duration (50 Hrs)
1. Prepare a business plan for setting up a small-scale mushroom production unit	1. Recognizing a business opportunity 2. Elements of business plan 3. Writing a business plan 4. Economics of mushroom production	1. Preparation of a business plan for setting up a small-scale mushroom production unit 2. Visits to mushroom production units and marketing outlets	30
2. Present a business plan	1. Making a presentation of the business plan	3. Preparing presentation of a business plan	20
Total			50

6. ORGANISATION OF FIELD VISITS

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace. Visit a Mushroom Production Unit and observe the following:

1. Layout of the Mushroom Production Unit
2. Types of mushroom grown
3. Spawn production procedure
4. Mushroom production procedure
5. Management of diseases and pests
6. Casing
7. Harvesting of mushrooms
8. Processing of mushrooms
9. Sale procedure for mushrooms
10. Manpower engaged in mushroom production, processing and marketing
11. Total expenditure of Mushroom Production 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.

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|---|--|
| 1. Bamboo for platform and trays | 11. Refrigerator for storing spawn (small) |
| 2. Box for mushroom transportation | 12. Rooms for mushroom growing |
| 3. Chaff cutter | 13. Spawn bottles |
| 4. Chemicals for sterilization and processing | 14. Sprayer |
| 5. Desert cooler | 15. Straw Immersion tank |
| 6. Exhaust fan | 16. Thermometers |
| 7. Hygrometers | 17. Trays for mushroom cultivation |
| 8. Luxmeter | 18. Water Pump |
| 9. Measuring tape | 19. Weighing balance |
| 10. Polythene | |

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
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1.	Post-graduation in Horticulture from a recognized Institute /University, with at least 1 year work/ teaching experience in relevant field	<ul style="list-style-type: none"> • Effective communication skills (oral and written) • Basic computing skills. 	18-37 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules.
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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 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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