

LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

Job Role: Fruit Pulp Processing Technician

(QUALIFICATION PACK: Ref. Id. FIC/Q0106)

SECTOR: Food Processing

Classes 11 and 12

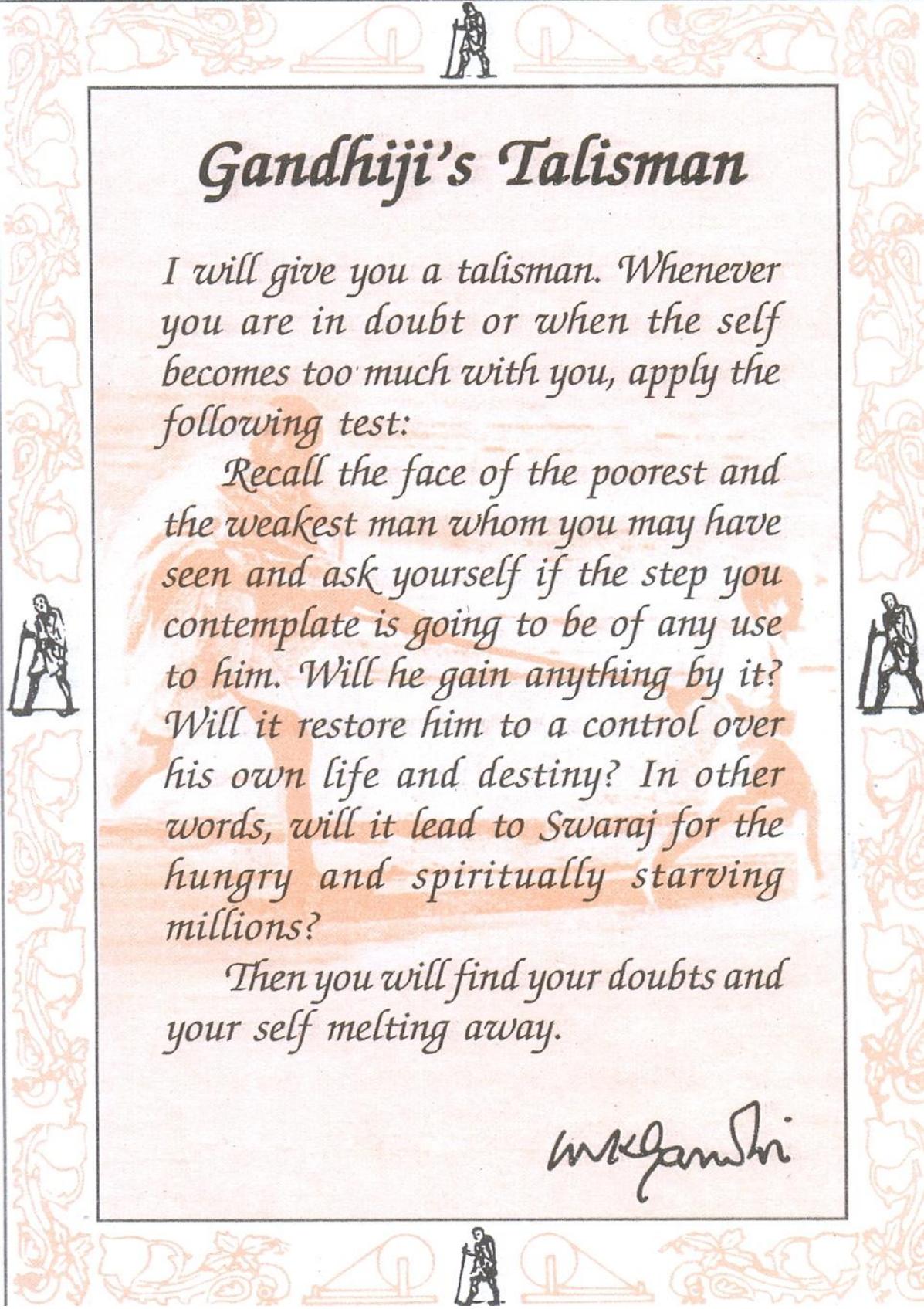


PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

(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.

M.K. Gandhi

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CURRICULUM**

**Food Processing- Fruit Pulp Processing
Technician**

June, 2017

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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 Ministry of Human Resource Development, Government of India in 2012. The PSS Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *Rashtriya Madhyamik Shiksha Abhiyan (RMSA)*. The main purpose of the learning outcome based curricula is to bring about the improvement in teaching-learning process and working competences through learning outcomes embedded in the vocational subject.

It is a matter of great pleasure to introduce this learning outcome based curriculum as part of the vocational training packages for the job role of Fruit Pulp Processing Technician. The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National 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 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.

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 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) and National Skill Development Corporation (NSDC) and Food Industry Capacity & Skill Initiative (FICSI) for their academic support and cooperation.

We are grateful to the contributors for their earnest efforts and contributions in the development of this learning outcome based curriculum. Their names are acknowledged in the list of contributors. The contributions of the course coordinator Uadal Singh and the reviewer Shalini Chakraborty, Food Scientist, Fruit Research Station (RVSKVV, Gwalior) Entkhedi, Bhopal are 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 & Technology, PSSCIVE in development of the curriculum for the employability skills are duly acknowledged.

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

PSSCIVE Team

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1. COURSE OVERVIEW

COURSE TITLE: Food Processing – Fruit Pulp Processing Technician

A Fruit Pulp Processing Technician is responsible for pulping/producing fruit pulp. A Fruit Pulp Processing Technician is responsible for pulping/producing fruit pulp through the process of receiving, ripening, checking raw material quality, sorting, washing, cutting/slicing, deseeding/de-stoning, pulping, pre-cooking, sterilizing, aseptic packaging or canning, sampling for quality analysis, and storing.

A Fruit Pulp Processing Technician must have the ability to plan, organize, prioritize, calculate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have stamina and professional hygiene.

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 of entrepreneurial skills and abilities;
- Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection
- Identify and control hazards in the workplace that pose a danger or threat
- Identify fruit suitability for pulp preparation
- Demonstrate the pulp extraction
- Apply the quality control of processed food
- Do preparation and maintain work area and equipment;
- Observe packing machines for various processed food product;
- Apply good manufacturing process
- Demonstrate waste utilization and its management;
- Demonstrate the work effectively with others;

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

COURSE LEVEL: This is an advance level course. The Fruit pulp processing technician course can be opt by a student who completed the job role like Packing machine worker or Industrial production worker in Class IX and Class X.

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	
		110	10
Part B	Vocational Skills		
	Unit 1: Introduction to Food Processing	35	40
	Unit 2: Fruit and Vegetable Processing	60	
	Unit 3: Introduction to Food Microbiology	25	
	Unit 4: Prepare and Maintain Work Area	55	
		165	40
Part C	Practical Work		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
		10	35
Part D	Project Work/Field Visit		
	Practical File/ Student Portfolio	10	10
	Viva Voce	05	05
		15	15
	Total	300	100

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

CLASS 12			
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	
		110	10
Part B	Vocational Skills		
	Unit 1: Preparation of Fruit Pulp	55	40
	Unit 2: Documentation and record keeping	30	
	Unit 3: Waste utilization of fruit and vegetable	30	
	Unit 4: Food quality and sanitation laws for processed food products	35	
	Unit 5: Occupational Health, Hygiene and First Aid Practices	15	
		165	40
Part C	Practical Work		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
		10	35
Part D	Project Work/Field Visit		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
		15	15
	Total	300	100

3. TEACHING/TRAINING ACTIVITIES

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

CLASSROOM ACTIVITIES

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

PRACTICAL WORK IN LABORATORY/WORKSHOP

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

FIELD VISITS/ EDUCATIONAL TOUR

In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

4. ASSISMENT AND CERTIFICATION

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

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

transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one comprising of internal assessment and second an external examination, including theory examination to be conducted by the Board. The assessment tools shall contain components for testing the knowledge and application of knowledge. The knowledge test can be objective paper based test or short structured questions based on the content of the curriculum.

WRITTEN TEST

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

Max. Mark: 40

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

5. UNIT CONTENTS

CLASS 11

Part A: Employability Skills

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

Unit 1: Communication Skill – III			
Learning Outcome	Theory (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

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

	goals, creating a schedule, making lists of tasks, balancing work and leisure, using different optimization tools to break large tasks into smaller tasks.		05
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Unit 3: Information and Communication Technology Skills - III

Learning Outcome	Theory (08 hrs)	Practical (12 hrs)	Duration (20 Hrs)
1. Create a document on word processor	<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 	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
2. Edit, save and print a document in word processor	<ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • Editing the text • Word wrapping and alignment • Changing font type, size and face • Inserting header and footer • Removing header and footer <ol style="list-style-type: none"> 2. Using autocorrect option 3. Insert page numbers and bullet 4. Save and print 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 	<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 	10

	performance and respect for work	values in Ice breaking, rapport building, group work and home assignments	
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

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	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 1. Preparing posters on green Sectors/Areas: cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries 	07
Total	45	65	110

Part B: Vocational Skills

Sino.	Units	Duration (Hrs)
1.	Introduction to Food Processing	35
2.	Fruit and Vegetable Processing	60
3.	Introduction to Food Microbiology	25
4.	Prepare and Maintain Work Area	55
Total		165

Unit 1: Introduction to the Food Processing			
Learning Outcome	Theory (15 hrs)	Practical (20 hrs)	Duration (35 Hrs)
1. Describe the importance of food processing	1. Meaning of food processing 2. Importance and need of food processing and preservation 3. Fruit and vegetable in human nutrition	1. Identification of the proceed product from vegetable and fruits	10
2. Categorize different sub-sectors under food processing	1. Introduction to different sub-sector of food processing 2. Role and contribution of different sub-sectors in Indian economy	1. Visit to a food processing industry and submit a report	15
3. Identify scope of food processing	1. Present scenarios of food processing in India 2. Scope and future prospects of food processing in India	--	10

Unit 2: Fruits and Vegetables Processing			
Learning Outcome	Theory (25 hrs)	Practical (35 hrs)	Duration (60 Hrs)
1. Describe the processing of fruits and vegetable	1. Importance of fruits and vegetable in human nutrition 2. Define fruits and vegetable processing 3. Identify quality parameters of fruit and vegetable processing	1. Identification of fruit and vegetable quality parameters for processing	05

2. Understand basic principle and methods of preservation	<ol style="list-style-type: none"> 1. Principles of food preservation and processing 2. Methods of preservation 3. Advantages of low cost technology for preservation and processing 	<ol style="list-style-type: none"> 1. Enlist the different processed products 	10
3. State the use of preservatives	<ol style="list-style-type: none"> 1. Define preservatives 2. Importance and types of the preservatives 3. Natural and chemical preservative 	<ol style="list-style-type: none"> 1. Demonstrate the use of preservatives 	05
4. Understand minimal processing technology	<ol style="list-style-type: none"> 1. Define minimal processing 2. Fruits and vegetable suitable for minimal processing 3. Preparation of fruits and vegetables for minimal processing 4. Care during minimal processing 5. Use of machinery in minimal processing 	<ol style="list-style-type: none"> 1. Demonstration of product preparation- cutting, slicing, shredding, cubing, dicing etc. 	10
5. Execute drying and dehydration process	<ol style="list-style-type: none"> 1. Drying, Dehydration and its importance 2. Selection of fruits and vegetables suitable for drying and dehydration 3. Sun drying, types of solar driers and dehydrators 4. Osmotic drying and dehydration 	<ol style="list-style-type: none"> 1. Demonstration of the drying process 2. Assessment of end point of dried products 	10
6. Carry out canning	<ol style="list-style-type: none"> 1. Define canning 2. Importance of canning 3. Fruits and vegetable suitable for canning 4. Process of canning 5. Precaution taken during canning 6. Testing of defects in canned products 	<ol style="list-style-type: none"> 1. Enlist the Fruits and vegetables suitable for Canning 2. Visit industry and prepare report of canning process 	10
7. Execute process of fermentation	<ol style="list-style-type: none"> 1. Define fermentation 2. Type of fermentation 3. Requirements of 	<ol style="list-style-type: none"> 1. Select fruits/ vegetable for fermentation 2. Demonstration fermentation process 	10

	fermentation 4. Common fermented products 5. Merit and demerits of fermentation	3. Select proper culture for fermentation	
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Unit 3: Introduction to Food Microbiology			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Understand importance of microbes in food processing	1. Impotence of microbes in food industry 2. Define food spoilage 3. Primary source of microorganism in food 4. Important properties of enzymes in fruit and vegetable 5. Factors affecting microbial growth in food	1. Enlist and discuss beneficial microbes in food industry	25

Unit 4: Prepare and Maintain Work Area			
Learning Outcome	Theory (25 hrs)	Practical (30 hrs)	Duration (55Hrs)
1. Discuss importance of pulp	1. Identify types of various fruit vegetables suitable for pulping 2. Identify chemical composition of fruit taken for pulp extraction	1. Enlist fruits and vegetable suitable for pulp extraction	10
2. Utilize the tools and equipment for pulp preparation	1. Understand types of machineries used in processing 2. Maintenance of process equipment 3. Unit operations in the preparation of Jam, Jelly and Ketchup	1. Demonstrate the processing unit and machineries used in processing	15
3. Maintain work area	1. Identify various section of working unit and their functioning 2. Outline hygiene and sanitation standards in processing unit 3. Define SOPs for disposal of waste material.	1. Enlist various approved sanitation practice as per SOPs standard	15

Unit 4: Prepare and Maintain Work Area			
Learning Outcome	Theory (25 hrs)	Practical (30 hrs)	Duration (55Hrs)
4. Maintain processing machineries and tools	1. Identify type of tools and equipment and their functioning in processing unit 2. Describe the working and performance of machines and tools 3. Types of chemicals, material for cleaning 4. Procedure to disinfect tool and equipments 5. Knowledge of food safety standard and regulation 6. Regulation pertaining to work place like health and safety	1. Identification of installed equipments and tools used 2. Demonstration of chemical maintenance	15
Total	65	100	165

CLASS 12

Part A - Employability Skills

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

Unit 1: Communication Skills-IV			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Describe the steps to active listening skills	1. Importance of active listening at workplace 2. Steps to active listening	1. Demonstration of the key aspects of becoming active listener 2. Preparing posters of steps for active listening	10
2. Demonstrate basic writing skills	2. Writing skills to the following: <ul style="list-style-type: none"> • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech 	1. Demonstration and practice of writing sentences and paragraphs on topics related to the subject	15

Unit 1: Communication Skills-IV			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
	<ul style="list-style-type: none"> Articles Construction of a Paragraph 		

Unit 2: Self-Management-IV			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Describe the various factors influencing self-motivation	<ol style="list-style-type: none"> Finding and listing motives (needs and desires); Finding sources of motivation and inspiration (music, books, activities); think expansive thoughts; living fully in the present moment; Dreaming big 	<ol style="list-style-type: none"> Group discussion on identifying needs and desire Discussion on sources of motivation and inspiration 	10
3. Describe the basic personality traits, types and disorders	<ol style="list-style-type: none"> Describe the meaning of personality Describe how personality influence others Describe basic personality traits Describe common personality disorders- paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive 	<ol style="list-style-type: none"> Demonstrate the knowledge of different personality types 	15

Unit 3: Information and Communication Technology Skills– IV			
Learning Outcome	Theory (08 hrs)	Practical (12 hrs)	Duration (20 Hrs)
1. Perform tabulation using spreadsheet application	<ol style="list-style-type: none"> Introduction to spreadsheet application Spreadsheet applications Creating a new worksheet Opening workbook and entering text Resizing fonts and styles Copying and moving Filter and sorting Formulas and functions Password protection. Printing a spreadsheet. Saving a spreadsheet in various formats. 	<ol style="list-style-type: none"> 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 	10

Unit 3: Information and Communication Technology Skills– IV			
Learning Outcome	Theory (08 hrs)	Practical (12 hrs)	Duration (20 Hrs)
		data <ul style="list-style-type: none"> • Applying elementary formulas and functions • Protecting the spreadsheet with password • Printing a spreadsheet • Saving the spreadsheet in various formats. 	
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

Unit 4: Entrepreneurship Development – IV			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Total Duration (25 Hrs)
1. Describe the general and entrepreneurial behavioural competencies	<ol style="list-style-type: none"> 1. Barriers to becoming entrepreneur 2. Behavioural and entrepreneurial competencies – adaptability/decisiveness, initiative/perseverance, interpersonal skills, organizational skills, stress management, valuing 	<ol style="list-style-type: none"> 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 	10

Unit 4: Entrepreneurship Development – IV			
Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Total Duration (25 Hrs)
	service and diversity	story and connect it to the definition of behavioural competencies 4. Preparation of competencies profile of students	
2. 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

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

Unit 5: Green Skills –IV			
Learning Outcome	Theory (05 hrs)	Practical (10 hrs)	Duration (15 Hrs)
	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		
Total	43	67	110

Part B–Vocational Skills

Sino.	Units	Duration (Hrs)
1.	Preparation of Fruit Pulp	55
2.	Documentation and record keeping	30
3.	Waste utilization of fruit and vegetable	30
4.	Food quality and sanitation laws for processed food products	35
5.	Occupational Health, Hygiene and First Aid Practices	15
	Total	165

Unit 1: Preparation of Fruit Pulp			
Learning Outcome	Theory (18 hrs)	Practical (37 hrs)	Duration (55 Hrs)
1. Select the suitable fruits for pulp preparation	1. Quality of fruits and vegetables based on appearance, colour, texture, flavour maturity etc 2. Explain fruit and vegetable washing 3. Sorting of fruit and vegetable on the basis of fruit size, shape, colour and texture etc.	1. Demonstration of physical parameters to know quality of fruit and vegetables for preparation of pulp 2. Depict the flowchart of washing and sorting	10
2. Carry out peeling, de-seeding/de-stoning of fruits	1. Apply procedure to peel out by peeler depending upon the types of fruits and vegetables 2. Understand types of peeling	1. Demonstration of peel out and de-seed/de-stone of the fruits	10

Unit 1: Preparation of Fruit Pulp			
Learning Outcome	Theory (18 hrs)	Practical (37 hrs)	Duration (55 Hrs)
3. Extract the fruit pulp	<ol style="list-style-type: none"> 1. Apply procedure to refine pulp by pulper refiner to sort out inert material like stone, bark, vegetable seeds, clog etc 2. Check the quality of fruit pulp through physical parameters like appearance, colour, odour etc. 	<ol style="list-style-type: none"> 1. Demonstrate function of pulper 2. Understand the sampling procedure for analysis of physical parameters of fruit pulp 	10
4. Prepare fruit pulp	<ol style="list-style-type: none"> 1. Apply approved procedure to prepare fruit pulp 2. Precautions taken during preparation of fruit pulp 	<ol style="list-style-type: none"> 1. Demonstrate preparation fruit pulp 	10
5. Carry out filling and packing of fruit pulp	<ol style="list-style-type: none"> 1. Suitable packing materials for fruit pulp 	<ol style="list-style-type: none"> 1. Identification of different packing material for fruit pulp 	05
6. Carry out aseptic sterilization of packed fruit pulp	<ol style="list-style-type: none"> 1. Understand the process of de-aeration, sterilization to aseptic packed material 2. Understand the basic manufacturing details on pulp container 	<ol style="list-style-type: none"> 1. Demonstrate the process of de-aeration, sterilization 2. Demonstrate manufacturing details on container 	10

Unit 2: Documentation and Record Keeping			
Learning Outcome	Theory (20 hrs)	Practical (10 hrs)	Duration (30 Hrs)
1. Keep record of raw material	<ol style="list-style-type: none"> 1. Importance of record keeping 2. Assess the details to be document at raw material collection stages 3. Understand loading process of raw material details in enterprise resource planning (ERP). 	<ol style="list-style-type: none"> 1. Enlist the importance of record keeping- 	10
2. Maintain record of production schedule and process	<ol style="list-style-type: none"> 1. Assess the details to be document at production schedule and process 	<ol style="list-style-type: none"> 1. Demonstration of record maintenance process at production schedule and process 	10

Unit 2: Documentation and Record Keeping			
Learning Outcome	Theory (20 hrs)	Practical (10 hrs)	Duration (30 Hrs)
	2. Understand record loading process of production schedule and process detail in enterprise resource planning (ERP).	stages	
3. Maintain record of finished product	1. Assess the details to be maintain and document at finished product stages 2. Understand loading the finished product detail in enterprise resource planning (ERP) for future reference		10

Unit 3: Waste Utilization of Fruit and Vegetable			
Learning Outcome	Theory (10 hrs)	Practical (20 hrs)	Duration (30 Hrs)
1. Recognize fruit and vegetable waste	1. Define waste 2. Identify various waste material from food industry 3. Merits of waste utilization	1. Visit a food industry and Identification of waste material from food industry	10
2. Utilize the waste from fruits and vegetables	1. Identify commercially manufactured product prepared from the waste of apple, citrus fruits, grape, guava, mango, Jamun, pineapple, tomato, etc. 2. Describe basic procedure to prepared product from fruit and vegetable waste	1. Demonstrate various manufactured product prepared product from fruit and vegetable	10
3. Understand waste disposal	1. Importance of waste disposal 2. Various methods of Waste disposal 3. Treatment of waste for disposal 4. Apply defined SOPs and industry required for dispose waste material.	1. Identification of the waste for disposal 2. demonstrate preparation of waste for disposal 3. Visit the waste treatment plant and prepare report	10

Unit 4: Food Quality and Sanitation Laws for Processed Food Products			
Learning Outcome	Theory (20 hrs)	Practical (15hrs)	Duration (35Hrs)
1. Explain the food quality	<ol style="list-style-type: none"> 1. Meaning and importance of food quality 2. Food quality control measures 3. Factor affecting food quality 	<ol style="list-style-type: none"> 1. Enlist and discuss the food quality standards and measures 	10
2. Recognize the food quality control standard, acts and legislation	<ol style="list-style-type: none"> 1. Quality assurance and international trades 2. Food safety, laws and standards 3. Basic principles of HACCP 4. Benefits of HACCP 5. Food standardization and regulatory agencies in India 6. Food Adulteration Act 	<ol style="list-style-type: none"> 1. Enlist and discuss the food quality control standard on flow chart 	15
3. Describe food additive	<ol style="list-style-type: none"> 1. Define food additive 2. Permitted limit of food colour, flavour and preservative used in food industry 	<ol style="list-style-type: none"> 1. Prepared flow chart on international acceptance limit of various food additive 	10

Unit 5: Occupation Health, Hygiene and First Aid Practices			
Learning Outcome	Theory (06 hrs)	Practical (09 hrs)	Duration (15 Hrs)
1. Recognize and adopt strategies for preventing hazardous conditions and work practices	<ol style="list-style-type: none"> 1. Types of hazards 2. Common hazards at Vegetable 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, and codes for Vegetable Farm 	<ol style="list-style-type: none"> 1. Reading of the manuals for tools, equipment and materials used at Vegetable Farm 2. Demonstration of the correct and safe use of tools, equipment and materials 3. Demonstration of the correct and safe storage of tools, equipment and materials 4. Discussion on the procedure for reporting any accident, incident or problem without delay to an appropriate person and taking action to reduce 	05

Unit 5: Occupation Health, Hygiene and First Aid Practices			
Learning Outcome	Theory (06 hrs)	Practical (09 hrs)	Duration (15 Hrs)
		further danger	
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	05
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	05
Total	74	91	165

6. ORGANISATION OF FIELD VISITS

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

Visit a Food processing industry and observe the following: Location, Site, Office building, Store, Washing chamber, Pulp extraction unit, Weighing room, Grading machines, packaging material, Packing Yard, storage chamber etc. During the visit, students should obtain the following information from the owner or the supervisor of the industry/processing unit:

1. Types of processed foods packed at the industry
2. Types of fruits used in pulp extraction at the industry
3. Applied methods of pulp extraction
4. Chemicals using in food processing industry
5. Types of packaging machines and packaging material used
6. Total number of packing machines
7. Total input and output handled annually
8. Manpower engaged
9. Total expenditure of the food processing industry
10. Total annual income
11. Profit/Loss (Annual)
12. 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.

Equipment/ Material

1. Receiving table
2. Fruit sorting table
3. Fruit grader
4. Fruit and vegetable washer
5. Fruit pulper
6. Fruit mill
7. Fruit juice extractor
8. Halving machine
9. Cutting machine
10. Fruit juice pasteurizer
11. Vacuum evaporator
12. Can float body reformer
13. Cutting knife
14. Leg cup sealing machine
15. Bottle washing machine
16. Syrup mixing tank
17. Juice and pulp transfer pump stainless steel
18. Inter connecting piping
19. Weighing machine
20. Hand refractometer
21. Bottle flesh pasteurizer
22. Steam jacket kettles
23. Boiler
24. pH meter
25. Water and juice analysis machine
26. Electronic top pan balance
27. Lye peeling machine
28. Vegetable bleacher

Chemicals

1. Sodium hydroxide pellets
2. Potassium meta bisulphite
3. Sodium benzoate
4. Common salt
5. Sugar

Glassware/ Material/ Packing material

1. S.S. Patila
2. S.S. Karchi
3. Storage bins
4. Aluminium/ Poly bags
5. Glass beakers
6. Measuring cylinder

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.	B. Sc/B. Tech/BE in Food Technology or Food Engineering from a recognized Institute /University, with at least 1 year work/teaching experience	<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.

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.

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