Model Curriculum – Standalone NOS

Entrepreneurship in Solar Water Heater Manufacturing

Model Curriculum

NOS Name: Entrepreneurship in Solar Water Heater Manufacturing

NOS Code: IID/N0053

NOS Version: 1.0

NSQF Level: 3.5

Model Curriculum Version: 1.0

Samadhan Samiti
2nd Floor, Siddhivinayak Building, 27/1/B Samadhan Tower, Gokhale Marg Lucknow - 226001

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Training Parameters

<table>
<tr><td>Sector</td><td>Environmental Science</td></tr>
<tr><td>Sub-Sector</td><td>Environmental Science</td></tr>
<tr><td>Occupation</td><td>Renewable Energy</td></tr>
<tr><td>Country</td><td>India</td></tr>
<tr><td>NSQF Level</td><td>3.5</td></tr>
<tr><td>Aligned to NCO/ISCO/ISIC Code</td><td>NCO 2015/1120.1700</td></tr>
<tr><td>Minimum Educational Qualification and Experience</td><td>a. Entry Qualification & Relevant Experience:
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<tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Required Experience (with Specialization - if applicable)</th></tr>
<tr><td>1</td><td>Class 11 Pass</td><td>1 Years of Experience</td></tr>
<tr><td colspan="3">or</td></tr>
<tr><td>2</td><td>Class 10 Pass</td><td>1.5* Years of Experience</td></tr>
<tr><td colspan="3">or</td></tr>
<tr><td>3</td><td>Class 8 Pass</td><td>4.5* Years of Experience</td></tr>
<tr><td colspan="3">or</td></tr>
<tr><td>4</td><td>NSQF Level 3 in relevant field</td><td>1.5* Years of Experience</td></tr>
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b. Age: 'As per the Govt. Norms' * (In relevant Industry)</td></tr>
<tr><td>Pre-Requisite License or Training</td><td>NA</td></tr>
<tr><td>Minimum Job Entry Age</td><td>18 years</td></tr>
<tr><td>Last Reviewed On</td><td>17th December, 2024</td></tr>
<tr><td>Next Review Date</td><td>16th December, 2027</td></tr>
<tr><td>NSQC Approval Date</td><td>17th December, 2024</td></tr>
<tr><td>NOS Version</td><td>1.0</td></tr>
<tr><td>Model Curriculum Creation Date</td><td>17th December, 2024</td></tr>
<tr><td>Model Curriculum Valid Up to Date</td><td>16th December, 2027</td></tr>
</table>

Model Curriculum Version	1.0
Minimum Duration of the Course	90 Hours 00 Minutes
Maximum Duration of the Course	90 Hours 00 Minutes

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Gain foundational knowledge in solar energy, radiation, solar-thermal principles, and their application in solar water heater technology.
- Learn about raw materials, quality standards, and inspection associated with solar water heater manufacturing.
- Understand machine, equipment, and infrastructure requirements for solar water heater production and optimization techniques.
- Acquire basic machine maintenance and calibration techniques to ensure consistent product quality.
- Understand the importance of insulation materials, temperature control, and regulation for efficient solar water heater performance.
- Create procurement strategies for sourcing raw materials and components, and ensure a reliable supply chain for manufacturing needs.
- Develop logistics and inventory management strategies, and optimize inventory levels to meet production and market demand.
- Identify market trends and opportunities in the solar water heater manufacturing business and develop effective sales and marketing strategies.
- Develop strategies to forecast sales and plan for demand in the solar water heater manufacturing business to optimize inventory and resource allocation.
- Apply theoretical knowledge to real-world scenarios and analyze data collected during the project.
- Enhance writing and presentation skills through the creation of a professional project report.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Entrepreneurship in Solar Water Heater Manufacturing - IID/N0053 NOS Version No. – 1.0 NSQF Level – 3.5	**60:00**	**30:00**	**00:00**	**00:00**	**90:00**
1. Mandatory Industry Specific Technical Modules	**40:00**	**00:00**	**00:00**	**00:00**	**40:00**
Module 1: Introduction to Solar Energy, Radiation, Solar-Thermal Principles, and its Application	03:00	00:00	00:00	00:00	03:00
Module 2: Introduction to Types of Solar Collectors	02:00	00:00	00:00	00:00	02:00
Module 3: Working Principle of Solar Water Heater and Its Classification	03:00	00:00	00:00	00:00	03:00
Module 4: Understanding the Importance of Heat Transfer Fluids and their Types	02:00	00:00	00:00	00:00	02:00
Module 5: Introduction to Solar Water Heater Assembly Components and Possible Design Types	03:00	00:00	00:00	00:00	03:00
Module 6: Selection Criteria for Solar Water Heater	03:00	00:00	00:00	00:00	03:00
Module 7: Solar Water Heater Raw Materials	02:00	00:00	00:00	00:00	02:00
Module 8: Quality Standards and Inspection Associated to Raw Materials	03:00	00:00	00:00	00:00	03:00
Module 9: Machine, Equipment and Infrastructure Requirement for Solar Water Heater Manufacturing	02:00	00:00	00:00	00:00	02:00

Module 10: Solar Water Heater Manufacturing Process	04:00	00:00	00:00	00:00	04:00
Module 11: Basic Machine Maintenance and Calibration Techniques	02:00	00:00	00:00	00:00	02:00
Module 12: Finished Solar Water Heater Testing, Performance Reporting and Packaging Methods	02:00	00:00	00:00	00:00	02:00
Module 13: Safety and Health Standards in Solar Water Heater Manufacturing	02:00	00:00	00:00	00:00	02:00
Module 14: Troubleshoots Analysis in Solar Water Heater Manufacturing	02:00	00:00	00:00	00:00	02:00
Module 15: Solar Water Heater Mounting and Installation Techniques	03:00	00:00	00:00	00:00	03:00
Module 16: Implementing Waste Management Techniques for Solar Water Heater Business	02:00	00:00	00:00	00:00	02:00
2. Mandatory Industry Specific Business Modules	**20:00**	**00:00**	**00:00**	**00:00**	**20:00**
Module 17: Identifying Market Trends and Opportunities in the Solar Water Heater Business	01:00	00:00	00:00	00:00	01:00
Module 18: Developing Effective Sales and Marketing Strategies for the Solar Water Heater Manufacturing Business	01:00	00:00	00:00	00:00	01:00
Module 19: Sales Forecasting and Demand Planning in the Solar Water Heater Manufacturing Business	02:00	00:00	00:00	00:00	02:00
Module 20: Developing Risk Management Strategies for the Solar Water Heater Manufacturing Business	01:00	00:00	00:00	00:00	01:00
Module 21: Developing Procurement Strategies for Raw Materials and Components in the Solar Water Heater Manufacturing Business	02:00	00:00	00:00	00:00	02:00

Module 22: Developing Strategies for Solar Water Heater Logistics and Inventory Management	01:00	00:00	00:00	00:00	01:00
Module 23: Building and Maintaining Effective Distributor Relationships in the Solar Water Heater Manufacturing Business	01:00	00:00	00:00	00:00	01:00
Module 24: Budgeting and Financial Literacy Techniques in the Solar Water Heater Manufacturing Business	02:00	00:00	00:00	00:00	02:00
Module 25: Revenue Management Techniques for the Solar Water Heater Manufacturing Business	02:00	00:00	00:00	00:00	02:00
Module 26: Implementing Time Management Strategies in the Solar Water Heater Manufacturing Business	02:00	00:00	00:00	00:00	02:00
Module 27: Human Resources Management in the Solar Water Heater Manufacturing Business	01:00	00:00	00:00	00:00	01:00
Module 28: Implementing Strategies for Export, Import and International Market Development for the Solar Water Heater Manufacturing Business	02:00	00:00	00:00	00:00	02:00
Module 29: Manage Branding and Promotion of Business	02:00	00:00	00:00	00:00	02:00
3. Mandatory Practical / Apprenticeship / Project Work / Survey / Other Experiential Learning	**00:00**	**30:00**	**00:00**	**00:00**	**30:00**
Module 30: Detailed Project Report on Solar Water Heater Manufacturing Business.	00:00	30:00	00:00	00:00	30:00
Total Duration	**60:00**	**30:00**	**00:00**	**00:00**	**90:00**

Module Details

Module 1: Introduction to Solar Energy, Radiation, Solar-Thermal Principles, and its application

Mapped to IID/N0053

Terminal Outcomes:

- Demonstrate a comprehensive understanding of solar energy, radiation principles, solar-thermal concepts, and their practical applications.
- Articulate the significance of solar energy in renewable energy systems and explain factors influencing solar radiation.
- Describe heat transfer mechanisms (conduction, convection, and radiation) relevant to solar-thermal systems and evaluate various applications of solar-thermal energy in real-world scenarios.

Duration: *<03:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should clarify the advantages and challenges associated with solar energy utilization. • Evaluate the impact of geographic location and seasonal variations on solar radiation levels. • Identify practical applications of solar-thermal energy, such as solar water heating and space heating. • Understand emerging applications and technologies in the field of solar-thermal energy.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 2: Introduction to Types of Solar Collectors

Mapped to IID/N0053

Terminal Outcomes:

- Define the fundamental principles of solar collectors.
- Elaborate on the different types of solar collectors and their operating mechanisms.
- Analyze efficiency and performance parameters to determine suitable applications for various collector types.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should define what solar collectors are and how they function to capture solar energy. • Students should categorize solar collectors based on their design and operational characteristics. • Evaluate efficiency metrics such as collector efficiency, heat loss coefficients, and stagnation temperature. • Analyze specific type of solar collector with suitable applications, considering factors like climate and energy demands.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 3: Working Principle of Solar Water Heater and Its Classification

Mapped to IID/N0053

Terminal Outcomes:

- Understand the basic working principles of solar water heaters.
- Learn about the classifications of solar water heaters and explore their design, operation, and efficiency aspects.
- Identify appropriate applications for different types of solar water heaters.

Duration: *<03:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the main components and subsystems involved in solar water heater systems. • Classify solar water heaters based on design configurations (e.g., passive vs. active systems, thermosiphon vs. pumped systems). • Compare the pros and cons of different solar water heater classifications in terms of performance and reliability. • Students should propose optimal solar water heater configurations for residential, commercial, and industrial applications.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 4: Understanding the Importance of Heat transfer Fluids and their types

Mapped to IID/N0053

Terminal Outcomes:

- Understand the fundamental principles of heat transfer and the critical role of heat transfer fluids in various applications.
- Learn about the different types of heat transfer fluids and the criteria for selecting appropriate fluids based on specific requirements.
- Analyze the performance and efficiency implications of various heat transfer fluids in different operational contexts.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the function of heat transfer fluids in facilitating energy transfer within solar collectors. • Students should categorize heat transfer fluids based on their chemical composition and thermal properties. • Propose suitable heat transfer fluids for different solar thermal applications based on operational requirements. • Compare the performance characteristics of heat transfer fluids in real-world applications to optimize system performance.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 5: Introduction to Solar Water Heater Assembly Components and Possible Design Types

Mapped to IID/N0053

Terminal Outcomes:

- Identify key components of solar water heater systems and understand their integration and interaction within the system.
- Explore different design types of solar water heaters and their respective functions.
- Identify the steps involved in assembling a solar water heater.

Duration: *<03:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should list and describe essential components of solar water heater systems and their functions. • Analyze components like solar collectors, storage tanks, and circulation pumps work together to facilitate heat transfer and water heating. • Analyze system designs that optimize component integration for maximum energy efficiency and reliability. • Outline the sequential steps involved in assembling a solar water heater system, from component installation to system testing.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 6: Selection Criteria for Solar Water Heater

Mapped to IID/N0053

Terminal Outcomes:

- Evaluate various solar water heating systems based on performance metrics.
- Understand the impact of environmental and site-specific conditions on system selection.
- Identify suitable system designs and configurations for specific applications, considering economic and maintenance factors.

Duration: *<03:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Analyze and compare performance metrics such as efficiency, reliability, and longevity across various solar water heating systems. • Analyze site-specific considerations such as space availability, orientation, and shading effects on system performance. • Students should recommend appropriate system configurations (e.g., thermosiphon vs. pumped systems) based on application requirements. • Students should calculate the return on investment (ROI) and assess the economic feasibility of implementing solar water heating systems.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 7: Solar Water Heater Raw Materials

Mapped to IID/N0053

Terminal Outcomes:

- Understand the key raw materials used in solar water heater components.
- Learn about the properties, selection criteria, and the impact of material choices on system performance and longevity.
- Identify sustainability and environmental considerations crucial in the selection of materials for solar water heaters.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify and classify key materials used in the construction of solar water heater components, such as absorber plates, insulation materials, and piping. • Evaluate and justify material selection based on technical specifications and operational requirements. • Analyze how material properties affect heat transfer efficiency, system reliability, and lifespan of solar water heaters. • Assess the environmental impact of material extraction, manufacturing processes, and end-of-life disposal in solar water heater systems.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 8: Quality Standards and Inspection Associated to Raw Materials

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of quality standards in selecting raw materials for solar water heaters.
- Learn about specific standards, certifications, inspection, and testing methods used to ensure material quality for solar water heater manufacturing.
- Comprehend documentation and traceability requirements for ensuring quality assurance in solar water heater production.

Duration: *<03:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Understand the significance of adhering to quality standards (e.g., ISO certifications) in ensuring material reliability and performance in solar water heating systems. • Understand testing protocols and procedures for verifying material compliance with quality standards. • Analyze test results and make recommendations based on quality assurance criteria. • Outline documentation requirements (e.g., material data sheets, certificates of conformity) for maintaining traceability and accountability in material selection.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 9: Machine, Equipment and Infrastructure Requirement for Solar Water Heater Manufacturing

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Terminal Outcomes:

- Understand the key machinery and equipment used in the manufacturing of solar water heaters.
- Learn about the infrastructure requirements for setting up a solar water heater manufacturing facility, including methods for site selection and facility planning.
- Identify best practices for setting up and maintaining a manufacturing facility dedicated to solar water heaters.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify and describe essential machinery and equipment for manufacturing solar water heater components. • Analyze facility design strategies that optimize workflow, material handling, and safety standards in solar water heater manufacturing. • Evaluate criteria for selecting an optimal site location for a solar water heater manufacturing facility. • Outline best practices for facility layout, equipment maintenance schedules, and workforce training to ensure operational efficiency and product quality.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 10: Solar Water Heater Manufacturing Process

Mapped to IID/N0053

Terminal Outcomes:

- Understand the complete manufacturing process of solar water heaters, including the specific steps involved in producing each component.
- Explore the technologies and equipment used in the manufacturing process of solar water heaters.
- Analyze case studies of successful manufacturing facilities to derive industry best practices.

Duration: *<04:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the sequential stages of manufacturing, from raw material procurement to final assembly and testing of solar water heaters. • Evaluate advanced manufacturing technologies and equipment with integration of robotics, sensors, and IoT in optimizing manufacturing operations and product quality. • Examine case studies of successful solar water heater manufacturing facilities, analyzing factors contributing to their operational excellence and market competitiveness.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 11: Basic Machine Maintenance and Calibration Techniques

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of regular machine maintenance and calibration in a manufacturing setting.
- Learn basic maintenance procedures, troubleshooting techniques, and calibration methods for various types of manufacturing equipment.
- Develop best practices for maintaining and calibrating equipment in a solar water heater manufacturing facility.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify potential risks and consequences of neglecting maintenance and calibration. • Students should apply troubleshooting techniques to diagnose and resolve common equipment issues. • Describe calibration procedures for different types of manufacturing equipment used in solar water heater production. • Outline a maintenance and calibration schedule to enhance equipment performance and reduce downtime.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 12: Finished Solar Water Heater Testing, Performance Reporting and Packaging Methods

Mapped to IID/N0053

Terminal Outcomes:

- Understand the significance of testing and performance reporting for finished solar water heaters, focusing on product quality and reliability.
- Learn about various testing methods to evaluate solar water heaters and gain knowledge in compiling and interpreting performance reports.
- Explore effective packaging techniques to safeguard solar water heaters during transportation and storage.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the role of testing and performance reporting in ensuring product quality and customer satisfaction. • Identify key performance indicators (KPIs) for solar water heaters. • Analyze test results to verify compliance with quality standards. • Evaluate different packaging materials and techniques to ensure the safe transportation and storage of solar water heaters.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 13: Safety and Health Standards in Solar Water Heater Manufacturing

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of safety and health standards in manufacturing and familiarize with key regulations and guidelines for workplace safety.
- Develop skills in risk assessment, implementing safety protocols, and exploring best practices for a safe and healthy work environment.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the significance of adhering to safety and health standards to prevent workplace accidents and ensure employee well-being. • Interpret key safety and health regulations relevant to the manufacturing industry. • Implement safety protocols and emergency response plans to address identified risks. • Students should recommend ergonomic and health promotion initiatives to enhance worker safety and well-being.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 14: Troubleshoots Analysis in Solar Water Heater Manufacturing

Mapped to IID/N0053

Terminal Outcomes:

- Understand the impact of unresolved issues on product quality and manufacturing efficiency in the solar water heater manufacturing process.
- Identify common issues and their causes, along with techniques for diagnosing underlying problems in the production process.
- Explore effective solutions and preventive measures to address and avoid recurring issues in manufacturing.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should explain how unresolved issues can lead to defects, reduced product performance, and customer dissatisfaction. • Students should explain how unresolved issues can lead to defects, reduced product performance, and customer dissatisfaction. • develop and implement corrective actions to resolve identified problems, ensuring changes are documented and communicated to relevant stakeholders. • Propose preventive measures such as process improvements, quality control checkpoints, and staff training programs to mitigate the risk of recurring issues.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 15: Solar Water Heater Mounting and Installation Techniques

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of proper mounting and installation of solar water heaters, including site assessment and selection of appropriate mounting systems.
- Learn techniques for securely and efficiently installing solar water heater components.
- Explore safety measures and best practices to ensure the reliable operation of solar water heaters.

Duration: *<03:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the significance of correct mounting and installation for the performance, safety, and longevity of solar water heaters. • Evaluate installation sites for factors such as solar exposure, structural integrity, and accessibility. • Students should optimize installation processes to enhance efficiency and minimize installation time, using tools and techniques that streamline the workflow. • Implement safety measures during installation, such as proper handling of equipment.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 16: Implementing Waste Management Techniques for Solar Water Heater Business

Mapped to IID/N0053

Terminal Outcomes:

- Manage waste effectively during solar water heater manufacturing and installation processes.
- Recycle materials like glass, metals, and plastics to reduce waste.
- Safely dispose of electronic components and hazardous materials.
- Integrate energy-efficient and sustainable practices in manufacturing operations.

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Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Understand waste streams in solar water heater manufacturing and installation. • Apply recycling and reuse techniques for materials. • Integrate sustainability in operational processes. • Demonstrate knowledge of compliance with environmental regulations.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 17: Identifying Market Trends and Opportunities in the Solar Water Heater Business

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Terminal Outcomes:

- Conduct market research to gather and analyze relevant market data.
- Analyze demand drivers and identify opportunities for business growth.
- Utilize market data to recognize emerging market segments and trends.

Duration: *<01:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain methods for collecting market data, such as surveys, interviews, and secondary research. • Evaluate how government policies, energy costs, and consumer behaviour influence market demand. • Interpret market research data to spot trends and opportunities for expanding the business. • Identify new market segments by analyzing demographic and behavioural data.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 18: Developing Effective Sales and Marketing Strategies for the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the challenges faced in sales and marketing.
- Identify target markets and develop effective sales strategies.
- Implement impactful marketing campaigns to drive business growth.

Duration: *<01:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the specific sales and marketing challenges in the solar water heater industry. • Categorize potential customers by demographics, geographic locations, and psychographic characteristics. • Outline the sales strategy and unique selling points of solar water heaters. • Design marketing campaigns tailored to specific customer segments.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 19: Sales Forecasting and Demand Planning in the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand sales forecasting and demand planning concepts.
- Learn various techniques for sales forecasting and demand planning.
- Develop strategies to optimize inventory and supply chain efficiency.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should explain the role of sales forecasting in inventory and resource management. • Describe various sales forecasting techniques, such as time-series analysis and regression models. • Develop plans to adjust inventory levels and production schedules according to demand forecasts. • Identify external factors like economic conditions and regulatory changes in their analysis.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 20: Developing Risk Management Strategies for the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of risk management in business operations.
- Learn techniques for effective risk assessment and evaluation.
- Develop strategies to mitigate risks and integrate risk management into business planning processes.

Duration: *<01:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the potential risks in solar water heater manufacturing and their impact on the business. • Describe techniques for risk identification and assessment. • Create risk mitigation strategies for identified risks and develop contingency plans to manage unforeseen events. • Propose methods to incorporate risk management into business planning and align risk management with strategic decision-making.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 21: Developing Procurement Strategies for Raw Materials and Components in the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the role of procurement in business operations and supply chain management.
- Learn various sourcing strategies and develop effective negotiation skills.
- Explore sustainable procurement practices and their importance in modern supply chains.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should explain the procurement process and its significance in the manufacturing supply chain. • Describe various sourcing strategies, such as single sourcing, multiple sourcing, and global sourcing. • Propose methods for maintaining strong supplier relationships and ensuring a resilient supply chain. • Suggest strategies for implementing responsible sourcing practices that consider environmental and social impacts.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 22: Developing Strategies for Solar Water Heater Logistics and Inventory Management

Mapped to IID/N0053

Terminal Outcomes:

- Understand logistics and inventory management concepts.
- Learn optimization techniques for efficient operations.
- Develop demand forecasting skills and explore strategies for supply chain improvement.

Duration: *<01:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should understand the role of logistics and inventory management in the supply chain. • Describe techniques for optimizing transportation and warehousing. • Create inventory plans based on forecasted demand and supply chain needs. • Develop strategies to improve responsiveness and resilience in the supply chain.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 23: Building and Maintaining Effective Distributor Relationships in the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the significance of distributor relationships in business operations.
- Learn strategies for selecting and onboarding distributors effectively.
- Develop management skills and explore techniques for fostering long-term distributor partnerships.

Duration: *<01:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should understand the impact of strong distributor relationships on business performance. • Describe criteria for identifying and selecting suitable distributors. • Propose methods to manage distributor performance. • Suggest techniques for maintaining long-term distributor relationships.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 24: Budgeting and Financial Literacy Techniques in the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand budgeting and financial planning principles.
- Learn various forecasting methods and develop financial analysis skills.
- Explore strategies for aligning financial planning with business objectives.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should explain the role of budgeting and financial planning in business management. • Describe various budgeting techniques, such as zero-based budgeting and rolling forecasts. • Exercise to analyse financial statements to assess business performance. • Suggest strategies to maximize profitability through effective financial planning.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 25: Revenue Management Techniques for the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the principles of revenue management and its role in maximizing profitability.
- Learn effective pricing strategies and develop skills in market segmentation and demand forecasting.
- Explore various strategies to optimize revenue and profitability through market analysis.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Understand the concept of revenue management and its significance. • Describe various revenue management techniques, such as dynamic pricing and yield management. • Propose methods to integrate revenue management into overall business strategy. • Suggest strategies to enhance profitability through effective revenue management.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 26: Implementing Time Management Strategies in the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of time management and its impact on productivity.
- Learn and apply productivity techniques, along with process analysis and improvement skills.
- Explore strategies to optimize workflow and effectively meet production schedules.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Students should understand the benefits of effective time management on production efficiency and output. • Outline productivity strategies to enhance efficiency with time management. • Propose improvement plans to optimize production workflows. • Develop strategies to streamline workflows and reduce downtime.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 27: Human Resources Management in the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Understand the importance of Human Resource Management (HRM) and its role in organizational success.
- Learn about various HR functions, including talent acquisition and employee engagement strategies.
- Develop skills to build and maintain a high-performing workforce through effective HR practices.

Duration: *<01:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the role of HRM in enhancing organizational effectiveness. • Describe the key HRM functions and their significance in the workplace. • Proposes methods for developing the workforce and engaging employees. • Students should suggest strategies for fostering a positive and productive work environment.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 28: Implementing Strategies for Export, Import and International Market Development for the Solar Water Heater Manufacturing Business

Mapped to IID/N0053

Terminal Outcomes:

- Develop strategic plans for entering and competing in international markets.
- Effectively manage import and export operations to enhance business profitability.
- Ensure compliance with international trade regulations for solar water heaters.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the challenges and opportunities associated with exporting and international market development. • Outline strategies for entering and expanding in foreign markets. • Ensure regulatory compliance for global trade in solar water heaters. • Optimize supply chain operations for competitive advantage in international markets.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 29: Manage Branding and Promotion of Business

Mapped to IID/N0053

Terminal Outcomes:

- Develop and implement effective branding strategies to establish a strong market presence.
- Plan and execute promotional campaigns using appropriate channels to reach the target audience.
- Analyze and evaluate the performance of branding and promotional activities using measurable KPIs.

Duration: *<02:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Understand Branding Fundamentals • Design a cohesive branding strategy to position the business in the market. • Create engaging content and promotional materials for various platforms. • Apply digital tools like social media, email marketing, and SEO for branding. • Ensure compliance with regulations and maintain ethical practices in branding and promotions.	NA
Classroom Aids:	
PC's / Laptop with Internet Connection	
Tools, Equipment and Other Requirements	
Laptop or Mobile	

Module 30: Detailed Project Report on Solar Water Heater Manufacturing Business.

Mapped to IID/N0053

Terminal Outcomes:

- Develop comprehensive project plans for the solar water heater manufacturing industry
- Create detailed business proposals, financial projections, and operational strategies
- Select and utilize appropriate research methods
- Gather and analyze market data to support informed decision-making

Duration: *<00:00>*	**Duration**: *<30:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
NA	• Create a comprehensive project plan outlining the objectives, timeline, resources, and scope of a small-scale solar water heater manufacturing business. • Demonstrate proficiency in selecting and utilizing appropriate research methods to gather relevant data on the solar water heater industry, market trends, and manufacturing processes. • Demonstrate the ability to analyze and interpret data accurately, drawing insights that contribute to the feasibility and success of the proposed business. • Create a well-structured project report that clearly outlines all critical aspects of the business, including market analysis, technical requirements, financial projections, and operational strategies. • Understand the solar water heater market by researching industry trends, customer needs, and competitive dynamics, and apply this knowledge to the project plan. • Manage financial projections and cash flow, ensuring the creation of realistic budgets, cost analysis, and financial models that support the business's financial viability.

	• Interpret research findings and draw meaningful conclusions to make informed decisions regarding the design, manufacturing process, and market entry strategy for the business. • Demonstrate presentation and communication skills by presenting the project report, objectives, findings, and recommendations effectively to stakeholders or potential investors.
Classroom Aids:	
NA	
List of Tools and Equipment at Industry Site (For Project Work /Entrepreneurship):	
Welding Equipment, Metal Cutting and Fabrication Tools, Assembly Tools, Cutting Tools, Brazing and Soldering Equipment, Forming and Pressing Machines, Machining Tools, Drilling Machine, Surface Finishing Tools, Testing and Measurement Instruments, Quality Control Tools, Safety Equipment, Material Handling Equipment, CNC Machining Tools, Electrical Equipment	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
MBA with Bachelor's Degree from UGC Recognized University or	Mechanical or Electrical or Renewable Energy Engineering	5+	Business or consultancy experience in the relevant field.	NA	NA	NA
Bachelor's Degree from any Government Recognized University or	NA	7+	Business or consultancy experience in the relevant field.	NA	NA	NA
12th Pass or	NA	10	Relevant Industry Experience	NA	NA	NA
NA	Entrepreneurs	7	In relevant fields	NA	NA	NA

Trainer Certification

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role "Entrepreneurship in Solar Water Heater Manufacturing", mapped to NOS Code: "IID/N0053, v1.0", Minimum accepted score is 80%.	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "Trainer (VET and Skills) MEP/Q2601 v3.0". Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/ Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
MBA with Bachelor's Degree from UGC Recognized University	Mechanical or Electrical or Renewable Energy Engineering	3	Experience in relevant qualification and an entrepreneur in the relevant field with 5 Years of experience	NA	NA	NA

Assessor Certification

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role "Entrepreneurship in Solar Water Heater Manufacturing", mapped to NOS Code: "IID/N0053, v1.0", Minimum accepted score is 80%.	Recommended that the Assessor is certified for the Job Role: "Assessor", mapped to the Qualification Pack: "Assessor (VET and Skills) MEP/Q2701 v3.0". Minimum accepted score is 80%.

Assessment Strategy

Assessment Overview: The purpose of this assessment SOP is to provide a structured and transparent process for evaluating students for the qualification "Entrepreneurship in Solar Water Heater Manufacturing Business." This process aims to identify candidates who possess the skills, knowledge, and potential to excel in this field, ensuring that only the most suitable students are selected.

To achieve this, the assessment will be conducted through a multi-faceted approach, including a written assessment, case study analysis, MCQ based segment-wise final tests, development, and evaluation of a comprehensive project report based on experiential learning, and a viva voice examination on the project work undertaken by the students.

Assessment Methods: The assessment for the online course "Entrepreneurship in Solar Water Heater Business" involves a multi-faceted approach to thoroughly evaluate candidates' qualifications and suitability. The key methods include:

- **Written Assessment:** The written assessment is an online test designed to evaluate candidates' knowledge of solar water heater technology, business concepts, and industry trends. This test emphasizes technical understanding, analytical skills, and theoretical knowledge relevant to the course. Candidates are required to complete written assignments and case studies simulating scenarios encountered in the solar water heater industry, which assess their critical thinking, problem-solving, and decision-making skills.

- **Case Study Analysis:** Candidates are provided with real-world scenarios related to solar water heater entrepreneurship. They are expected to analyze these cases, identify problems, propose solutions, and demonstrate their problem-solving and decision-making skills. This method assesses the practical application of theoretical knowledge and entrepreneurial thinking.

- **MCQ-Based Segment-Wise Final Tests:** Multiple-choice questions (MCQs) are used to test candidates' knowledge and understanding across different segments of the course. These tests are structured to evaluate comprehension of key concepts, retention of information, and the ability to apply knowledge in various contexts.

- **Development and Evaluation of a Comprehensive Project Report:** Candidates must develop a detailed project report based on experiential learning, involving real-world application, research, planning, and execution related to solar water heater manufacturing and entrepreneurship. The project report is evaluated for originality, depth of analysis, feasibility of the business plan, and practical insights. This assessment measures candidates' ability to apply theoretical knowledge in a practical context.

- **Viva Voce Examination on the Project Work:** The viva voce is an oral examination that assesses candidates' understanding of their project, their ability to defend their work, clarity of thought, and communication skills. It also evaluates their critical

thinking and responsiveness to feedback, ensuring a comprehensive understanding and practical capability in solar water heater entrepreneurship.

Assessment Criteria: The assessment criteria for each assessment method will be aligned with the learning outcomes of the qualification. Criteria may include:

- **Technical Knowledge:** Evaluation of understanding of solar water heater technology and application of theoretical concepts.
- **Business Concepts:** Assessment of knowledge related to business management, market analysis, and entrepreneurship.
- **Analytical Skills:** Ability to analyze information, draw conclusions, and solve problems effectively.
- **Problem Identification:** Skill in identifying key issues and challenges in the provided case study.
- **Critical Thinking:** Ability to evaluate different aspects of the case and provide a well-reasoned analysis.
- **Application of Knowledge:** Ability to apply theoretical knowledge to practical scenarios.
- **Retention of Information:** Demonstration of retention and understanding of key concepts.
- **Project Planning and Execution:** Thoroughness and feasibility of the business plan and project execution.
- **Research and Analysis:** Depth of research, data collection, and analysis presented in the report.
- **Understanding of Project:** Depth of understanding and clarity of thought regarding the project work.
- **Overall Presentation:** Confidence, clarity, and professionalism during the viva voce examination.

Assessment Schedule: Assessment tasks will be distributed throughout the duration of the qualification to ensure ongoing feedback and opportunities for improvement. The final project report and viva voice examination will typically be scheduled towards the end of the qualification, allowing students to integrate and apply their learning from the entire program.

Assessment Integrity: To ensure the integrity of the assessment process, all assessments will be conducted in accordance with the institution's policies and procedures. Measures will be in place to prevent plagiarism and cheating, and assessments will be marked by qualified and impartial assessors, as elaborated in Qualification File.

Conclusion: The assessment strategy outlined above aims to provide a rigorous and comprehensive evaluation of students' knowledge, skills, and competencies in managing a car wash business. By combining written assignments, tests, project work, and viva voice examinations, the assessment strategy ensures that students are well-prepared to succeed in the dynamic and competitive car wash industry.

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
SOP	Standard Operating Procedure
WI	Work Instructions
PPE	Personal Protective equipment