

Syllabus
On
Glassware Sector
Under Skill Development Initiative **(SDI)** Scheme
Based on
Modular Employable Skills **(MES)**

Designed in 2010

Directorate General of Employment & Training
Ministry of Labour & Employment
Government of India

**Course Curricula for Short Term Courses based on
Modular Employable Skills (MES) in
Glass Ware Sector**

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List of members attended the Trade Committee Meeting for designing the course curriculum on “Glass Ware Sector” under Skill Development Initiative Skill (SDIS) based on Modular Employable Skills (MES) held on 07.09.2010 at ITI Mulund Committee Room, Mumbai

List of the Members attended the Trade Committee Meeting to design the syllabus of “Glass Ware” under Craftsman Training Scheme (CTS) on 08.09.2010 at ITI Mulund Committee Room, Mumbai

Sl. No.	Name of the Member & Designation	Representing Organisation with full address	Remarks
1.	Vasantrao R. Janawade, General Manager, Personnel	Vitrum Glass, Mumbai	Chairman
2.	Ramesh Domala, Sr. Manager	Vitrum Glass, Mumbai	Member
3.	J. S. Save, General Manager, Design & Development	Vitrum Glass, Mumbai	Member
4.	S. M. Sadamate, Asst App. Advisor. Technical	BTRI, Mulund, Maharashtra	Member
5.	P. S. Wagh, Principal	ITI, Mulund	Member
6.	M. A. Ghokhale, Production Manager	Borosil Glass Work Ltd, Mumbai	Member
7.	S. U. Modi, Manager	Neutral Glass & Allied Industries	Member
8.	Hemant Goyal, Production Manager	Gayal Scientific Glass Work Pvt Ltd	Member
9.	Kiran Bangera, Manager	Bhatia Glass Tuff Pvt Ltd	Member
10.	Abhinoy Nandi, Dy. Director	CSTARI, Kolkata, Gov of India	Member

Skill Development based on Modular Employable Skills (MES)

Background

The need for giving emphasis on Skill Development, especially for the educated unemployed youth (both for rural & urban) has been highlighted in various forums. Unfortunately, our country's current education system does not give any emphasis on development of skills. As a result, most of the educated unemployed youths are found wanting in this area, which is becoming their Achilles heel.

As India is on the path of economic development and the share of service sector's contribution to the GDP of the country is increasing (53% of GDP) it is becoming imperative that Government of India along with other nodal agencies play an important role in providing employable skills, with special emphasis on Skills.

Hence, need of the hour is some policy change at Apex level which will address the needs of the changing economy and look at providing mandatory skills training to all educated unemployed youths, with a view to have them gainfully employed. This shift in policy will ultimately benefit all the stake holders, namely the individuals, industry, Government and the economy by way of providing employment, increasing the output/productivity and ultimately resulting in a higher DDP for the nation.

- **Frame work for skill development based on 'Modular Employable Skills (MES)'**

Very few opportunities for skill development are available for the above referred groups (educated unemployed youth). Most of the existing skill development programmes are long term in nature. Poor and less educated persons cannot afford long term training programmes due to higher entry qualifications, opportunity cost, etc. Therefore, a new framework for skill development has been evolved by the DGET to address the employability issues.

The **key features of new framework for skill development** are:

- Demand driven short term training courses based on modular employable skills decided in consultation with Industries.
- Flexible delivery mechanism (part time, week ends, full time)
- Different levels of programmes (foundation level as well as skill up gradation) to meet demands of various target groups
- Central Government will facilitate and promote training while vocational training (VT) providers under the Govt. and Private Sector will provide training
- Optimum utilization of existing infrastructure to make training cost effective.

- Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially.
- Testing & certification of prior learning (skills of persons acquired informally)

The Short Term courses would be based on “Modular Employable Skills (MES)”.

The **concept for the MES** is:

- ✓ Identification of minimum skills set, which is sufficient to get an employment in the Labour market.
- ✓ It allows skills upgradation, multi skilling, multi entry and exit, vertical mobility and life long learning opportunities in a flexible manner.
- ✓ It also allows recognition of prior learning (certification of skills acquired informally) effectively.
- ✓ The modules in a sector when grouped together could lead to a qualification equivalent to National Trade Certificate or higher.
- ✓ Courses could be available from level 1 to level 3 in different vocations depending upon the need of the employer organizations.
- ✓ MES would benefit different target groups like:
 - ✓ Workers seeking certification of their skills acquired informally
 - ✓ Workers seeking skill upgradation
 - ✓ Early school drop-outs and unemployed
 - ✓ Previously child Labour and their family

INTRODUCTION

Economic growth in India is increasingly supported by robust industrial growth. Glass Ware Sector is one of the relatively lesser known but significant sectors that support almost all industrial activity. However, notwithstanding its importance and size (INR 4 trillion), it has traditionally not been accorded the attention it deserves as a separate sector in itself. The level of inefficiency in Glass Ware activities in the country has been very high across all modes.

The required pace of efficiency and quality improvement will demand rapid development of capabilities of Glass Ware service providers. And with Glass Ware being a service oriented sector, skill development will emerge as a key capability.

This lack of focus on developing manpower and skills for the Glass Ware sector has resulted in a significant gap in the numbers and quality of manpower in the sector.

This gap, unless addressed urgently, is likely to be a key impediment in the growth of the Glass Ware sector in India and in consequence, could impact growth in industry and manufacturing sectors as well.

This underscores the need identifying areas where such manpower and skill gaps are critical, and developing focused action plans to improve the situation.

A look at the required initiatives for manpower development in the sector makes it clear that sustainable development of the sector’s manpower requires a

collaborative public private effort. The level of commitment demonstrated by each stakeholder would largely determine the direction that the sector heads towards.

Age of participants

The minimum age limit for persons to take part in the scheme is 14 years but there is no upper age limit.

Curriculum Development Process

Following procedure is used for developing course curricula

- Identification of Employable Skills set in a sector based on division of work in the Labour market.
- Development of training modules corresponding to skills set identified so as to provide training for specific & fit for purpose
- Organization of modules in to a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, pre requisites for higher level modules and how one can progress from one level to another.
- Development of detailed curriculum and vetting by a trade committee and by the NCVT

(Close involvement of Employers Organizations, State Governments and experts, vocational

Training providers and other stakeholders are ensured at each stage).

Development of Core Competencies

Possession of proper attitudes is one of the most important attributes of a competent person. Without proper attitudes, the performance of a person gets adversely affected. Hence, systematic efforts will be made to develop attitudes during the training programmed.

The trainees deal with men, materials and machines. They handle sophisticated tools and instruments. Positive attitudes have to be developed in the trainees by properly guiding them and setting up examples of good attitudes by demonstrated behaviors and by the environment provided during training.

Some important core competencies to be developed are:

1. Communication skills
2. Better usage of Vernacular
3. Presentation skills
4. Self management
5. Resume preparation
6. GD participation/facing techniques
7. Interview facing techniques

Duration of the Programme:

Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different backgrounds and experience. Duration has been prescribed in hours in the curriculum of individual module, which are based on the content and requirements of a MES Module. However, some

persons may take more time than the prescribed time. They should be provided reasonable time to complete the course.

Pathways to acquire Qualification:

Access to the qualification could be through:

- ⊗ An approved training Programme.

Methodology

The training methods to be used should be appropriate to the development of competencies. The focus of the programme is on “performing” and not on “Knowing”. Lecturing will be restricted to the minimum necessary and emphasis to be given for learning through active participation and involvement.

The training methods will be individual centered to make each person a competent one. Opportunities for individual work will be provided. The learning process will be continuously monitored and feedback will be provided on individual basis.

Demonstrations using different models, audio visual aids and equipment will be used intensively.

Instructional Media Packages

In order to maintain quality of training uniformly all over the country, instructional media packages (Imps) will be developed by the National Instructional Media Institute (NIMI), Chennai.

Assessment

DGE&T will appoint assessing bodies to assess the competencies of the trained persons. The assessing body will be an independent agency, which will not be involved in conducting the training programme. This, in turn, will ensure quality of training and credibility of the scheme. Keeping in view, the target of providing training/testing of one million persons through out the country and to avoid monopoly, more than one assessing bodies will be appointed for a sector or an area.

Certificate

Successful persons will be awarded competency-based certificates issued by **National Council for Vocational Training (NCVT)**.

Course Matrix

Glass Ware SECTOR

Level-3
Module-8

Glass Furnace Operator

Module-7

Annealing Oven / Lehr Operator

Module-6

Sand Blasting

Level-2
Module-5

Glass Toy making

Module-4

Glass Painting

Module-3

Glass Cutting & Polishing

Level-1
Module-4

Glass Ball Maker

Module-3

Glass Batch Maker

Design with Glass (Assistant)

Kiln formed Glass

COMPETENCY-BASED MODULAR EMPLOYABLE SKILLS (MES)

Name : Level 1: Kiln-formed Glass

Code : : GLW101

Sector : Glassware

Entry Requirements : 14 years of age and above and functionally literate. Should not be colour blind. Drawing skills and an aptitude for design would be desirable.

Terminal Competency: To achieve a qualification at this level, the trained person must demonstrate competency in the following:

Basic Common Competency

1. Differentiate between various types of glass products according to (a) quality of glass, and (b) methods of manufacturing of product.
2. Differentiate between various shades of a colour.
3. Measure glass using different units of measurement (of distance – length, breadth, width; of area, of volume etc).
4. Safely and correctly operate equipment, tools, and handle raw materials.

Specific Competency

1. Select the correct type of glass to make a certain product in a kiln.
2. Store correctly the various types of flat glass used to make kiln-based glassware.
3. Use the various common tools required in kiln-formed glassmaking.
4. Perform glass cutting (pre-fusing/slumping) according to given specifications.
5. Operate a kiln as required to prepare a specific product.
6. Perform basic fusing of glass in a kiln according to given specifications.
7. Perform basic slumping of glass in a kiln according to given specifications.

Pathway: At the completion of level -1 kiln formed glass qualification, a student may enter level 2 kiln fused glass making and design with glass.

Duration : 120 hours

Contents : Given below

<i>Practical Competencies</i>	<i>Underpinning Knowledge (Theory)</i>
<p>Differentiate between various types of glass products according to (a) quality of glass, and (b) methods of manufacturing of product.</p> <p>Select the correct type of glass to make a certain product in a kiln</p>	<p>Knowledge of characteristics, properties, and usage of soda-potash glass, borosilicate glass, and lead-based glass.</p> <p>Knows about the various types of glass available for using in kiln, and the products that can be made using the kiln</p>
<p>Measure glass using different units of measurement (of distance – length, breadth, width; of area, of volume etc)</p>	<p>Knowledge of SI (le Système international d'unités) scale of units, formulae.</p>
<p>Differentiate between various shades of a colour</p>	<p>Knowledge of various colour names and shades. Must be standardised to a specific palette type.</p> <p>Should know about social indications of specific colours.</p>
<p>Safely and correctly operate equipment, tools, and handle raw materials</p>	<p>Understanding importance of communication, instructions, and specifications given to perform tasks.</p>
<p>Use the various common tools required in kiln-formed glassmaking</p> <p>Perform glass cutting (pre-fusing/slumping) according to given specifications</p>	<p>Knowledge of different fuel-based kilns (electric, gas-fired), different loading-orientation kilns (front-loader, top-loader).</p> <p>Knowledge of glass cutter (oil-cutter with diamond-topped wheel) to cut straight and curved shapes, and a round glass cutter to cut circles.</p> <p>Knowledge of pliers to break the glass, hand grinders, rulers and scales, and drawing papers, pens and pencils. Also sifters/sieves for colour application.</p>
<p>Operate a kiln as required to prepare</p>	<p>Awareness of importance and method of</p>

<p>a specific product</p> <p>Perform basic fusing of glass in a kiln according to given specifications</p> <p>Perform basic slumping of glass in a kiln according to given specifications</p>	<p>cleaning of glass before putting in kiln for slumping/fusing etc.</p> <p>Knowledge of design-specific moulds (used in slumping) and materials used (steel, ceramic, fibre paper, terracotta, sand, and plaster of Paris).</p> <p>Knowledge of standard terms such as compatibility, thermal shock, soaking, kiln shelf, props, shelf primer/separator, etc.</p> <p>Familiarisation with various buttons (and options) on the programming panel of the kiln.</p>
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Assessment: To achieve the terminal competencies the competency based assessment must be demonstrated against the performance criteria detailed in each terminal competency.

Resources:

- Wooden table and chair
- Cutting table with attached blanket
- Glass cutter and plier
- Bucket, brush
- Clay
- Measuring mugs
- Hammer
- Wooden planks (18" x 10")
- Sketch pad
- Various types of sketch pencils, colour pencils, and erasers
- Tracing paper
- Computer with internet connection
- Samples of float/sheet glass (clear as well as coloured)
- Measurement tools – tape measure, scale, weighing scale, scissor, cutter.
- Ceramic fibre paper (for mould-making)
- Blackboard/whiteboard
- Palette shade card
- Design books
- Samples of various kiln-formed products
- Safety equipment (first-aid kit, fire extinguisher, gloves etc.)

Terminal Competency Title: *Differentiate between various types of glass products according to (a) quality of glass, and (b) methods of manufacturing of product*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Differentiate glass based on quality	<ul style="list-style-type: none"> ▶ Tap surface of glass and hear quality of the sound ▶ Examine glass carefully to check for presence of cords, bubbles, and stones ▶ Examine shine and transparency of glass
2. Differentiate products based on manufacturing method	<ul style="list-style-type: none"> ▶ Examine both sides of glass surface for uniform smoothness and thickness ▶ Examine shine and transparency of glass

Terminal Competency Title: *Differentiate between various shades of a colour*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Understand types of shades and colours	<ul style="list-style-type: none"> ▶ Distinguish the items/ glass according to shades of colours.

Terminal Competency Title: *Measure glass using different units of measurement (of distance - length, breadth, width; of area, of volume etc)*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Use scale correctly	<ul style="list-style-type: none"> ▶ View scale reading correctly to avoid parallax error

Terminal Competency Title: *Safely and correctly operate equipment, tools, and handle raw materials*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Observe good personal and workplace safety practices	<ul style="list-style-type: none"> ▶ Wear protective spectacles, mask and gloves ▶ Communicate clearly when moving with glass ▶ Read safety instructions on tools before using them ▶ Store tools and materials safely when not in use ▶ Maintain and repair tools regularly

Terminal Competency Title: *Select the correct type of glass to make a certain product in a kiln*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Utilise correct thickness of glass as per design	<ul style="list-style-type: none">▶ Determine end-user's usage of the product▶ Identify glass thickness required based on design specifications▶ Calculate glass thickness required based on kiln performance limitations
2. Use correct colour of glass	<ul style="list-style-type: none">▶ Finalise colour(s) of glass used in design based on standard colour palette
3. Use correct mould	<ul style="list-style-type: none">▶ Determine mould to be used as per the design of the glass item▶ Identify thickness of glass according to the depth of the mould

Terminal Competency Title: *Store correctly the various types of flat glass used to make kiln-based glassware*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Store glass vertically	<ul style="list-style-type: none">▶ Wear gloves while handling glass.▶ Stack glass along shorter edge.▶ Hold glass in front of body, parallel to the plane of the body; do not tuck under arm.
2. Use correct and safe place for storing glass	<ul style="list-style-type: none">▶ Locate storage area away from workspace or movement corridors▶ Ensure storage area has enough movement space for person handling glass▶ Locate storage area on same level as workspace; avoid need to use stairs while shifting glass to and from storage area▶ Use wooden shelf to store glass

Terminal Competency Title: *Use the various common tools required in kiln-formed glass making*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Identify correct tools to be used	<ul style="list-style-type: none">▶ Use correct tools as per the design of the item
2. Store tools	<ul style="list-style-type: none">▶ Arrange tools correctly in tool box

correctly before and after use	
3. Check tools for any defects before and after use	▶ Examine tools periodically as per set schedule

Terminal Competency Title: *Perform glass cutting (pre-fusing/slumping) according to given specifications*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Identify and arrange correct tools to be used	▶ Use correct glass cutter, pliers etc., as per specific design requirements
2. Check and clean glass cutting table before use	▶ Check table for leftover glass bits and other debris ▶ Smoothen blanket and check that it is securely tied to the table
3. Trace design correctly on butter paper	▶ Fix butter paper correctly and ensure it is smooth on the surface ▶
4. Score glass correctly	▶ Outline on glass surface using marker, the design on the butter paper ▶ Hold glass cutter at the right angle and in the right direction ▶ Apply correct hand pressure to score glass along the marked outline ▶ Apply correct amount of pressure on pliers to break glass along the score line

Terminal Competency Title: *Operate a kiln as required to make a specific product*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Check kiln is in usable condition	▶ Check cleanliness of kiln before and after use ▶ Check electrical connections of kiln before and after use ▶ Check if kiln shelf is in good condition and is of the correct size
2. Arrange kiln shelf correctly	▶ Determine height inside kiln at which to place shelf ▶ Use kiln wash (shelf primer)/fibre paper (as a separator) to line surface of kiln shelf
3. Set firing cycle	▶ Check that buttons of control panel are functioning

	<ul style="list-style-type: none"> ▶ Enter program carefully according to calculated pattern
4. Load kiln with raw materials correctly	<ul style="list-style-type: none"> ▶ Arrange glass pieces on kiln wash/fibre paper as per design ▶ Ensure kiln is sealed before running firing program
5. Monitor kiln operation correctly	<ul style="list-style-type: none"> ▶ Periodically check kiln to ensure temperature is changing according to program ▶ Open kiln only once it has reached room temperature
6. Unload finished products correctly	<ul style="list-style-type: none"> ▶ Remove products from kiln once they can be touched with bare fingers

Terminal Competency Title: *Perform basic fusing of glass in a kiln according to given specifications*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Determine the type of glass required as per the design	<ul style="list-style-type: none"> ▶ Measure thickness of glass ▶ Determine colour of glass ▶ Check for glass compatibility (if fusing glass from different manufacturers)
2. Cut glass according to specifications	<ul style="list-style-type: none"> ▶ Ensure blanket is fastened to table and is smooth ▶ Wear gloves while placing glass on table ▶ Identify correct glass cutter ▶ Ensure oil level in glass cutter is sufficient ▶ Score glass using sufficient hand pressure and maintaining desired shape outline ▶ Use pliers to break glass applying correct amount of hand pressure
3. Clean and prepare glass for fusing	<ul style="list-style-type: none"> ▶ Smoothen edges of glass (linish) using appropriate grinder if glass has jagged/rough edges ▶ Wash glass and wipe dry with newspaper
4. Prepare the kiln shelf	<ul style="list-style-type: none"> ▶ Use kiln wash/glass fibre paper as a separator between glass and surface of kiln shelf
5. Arrange glass on the kiln shelf as required per the design	<ul style="list-style-type: none"> ▶ Surround arranged glass pieces with ceramic 'props' to prevent glass from flowing out of the desired shape while at high temperature
6. Correctly program the firing cycle in the kiln	<ul style="list-style-type: none"> ▶ Determine the correct firing cycle required for the product being made in the kiln <ul style="list-style-type: none"> • Determine highest temperature to be reached, duration in which to reach desired temperature, soaking time, and cooling duration

	<ul style="list-style-type: none"> ▶ Write down firing cycle in notebook and, if possible/ feasible, verify with colleagues ▶ Determine the buttons to be pressed, the number of button presses, and the sequence of their pressing
7. Finish fired glass piece as required	<ul style="list-style-type: none"> ▶ Use plastic brush with hard bristles to remove any unwanted materials stuck to the glass item after firing ▶ Wash glass piece ▶ Smoothen edges of glass (linish) using appropriate grinder if glass has jagged/rough edges ▶ Polish the ground areas to get a smooth edge and shine

Terminal Competency Title: *Perform basic slumping of glass in a kiln according to given specifications*

Unit Coverage

<i>Element</i>	<i>Performance Criteria</i>
1. Determine the type of glass required as per the design	<ul style="list-style-type: none"> ▶ Measure thickness of glass ▶ Determine colour of glass
2. Determine the type of mould required as per the design	<ul style="list-style-type: none"> ▶ Determine the material from which the mould will be prepared as per quantity of final product required ▶ Construct mould as per design specifications ▶ Clean and dry mould properly before use
3. Cut glass according to specifications	<ul style="list-style-type: none"> ▶ Ensure blanket is fastened to table and is smooth ▶ Wear gloves while placing glass on table ▶ Identify correct glass cutter ▶ Ensure oil level in glass cutter is sufficient ▶ Score glass using sufficient hand pressure and maintaining desired shape outline ▶ Use pliers to break glass applying correct amount of hand pressure
4. Clean and prepare glass for fusing	<ul style="list-style-type: none"> ▶ Smoothen edges of glass (linish) using appropriate grinder if glass has jagged/rough edges ▶ Wash glass and wipe dry with newspaper
5. Prepare the kiln shelf	<ul style="list-style-type: none"> ▶ Use kiln wash/ glass fibre paper as a separator between glass and surface of kiln shelf
6. Arrange glass on the kiln shelf as required per the design	<ul style="list-style-type: none"> ▶ Arrange glass pieces in the mould ▶ Use glass separators for metal mould

7. Correctly program the firing cycle in the kiln	<ul style="list-style-type: none"> ▶ Determine the correct firing cycle required for the product being made in the kiln <ul style="list-style-type: none"> • Determine highest temperature to be reached, duration in which to reach desired temperature, soaking time, and cooling duration ▶ Write down firing cycle in notebook and, if possible/feasible, verify with colleagues ▶ Determine the buttons to be pressed, the number of button presses, and the sequence of their pressing
8. Finish fired glass piece as required	<ul style="list-style-type: none"> ▶ Use plastic brush with hard bristles to remove any unwanted materials stuck to the glass item after firing ▶ Wash glass piece ▶ Smoothen edges of glass (linish) using appropriate grinder if glass has jagged/rough edges ▶ Polish the ground areas to get a smooth edge and shine

In summary, the successful trainee will have knowledge of characteristics such as materials used, techniques, colour, shape, proportions, and method of combination of constituent parts of a design. He/she will be equipped to set up a workshop and/or work as part of a team for a larger kiln-process operation.

Technical Workshop for Preparation of Curriculum on Kiln Formed Glass

One day Technical workshop was conducted by the ILO on 27/11/2009 in Hotel Monark in Firozabad to review and finalize the training curriculum with stakeholders. Agenda of the workshop included presentation of the course details, feedback from the participants and group discussions on course details. Following stakeholders participated in the workshop:

TIs/ITCs

1. Udayaveer Singh Yadav, ASHA ITC Firozabad
2. Satish Sharma, ITI Tundla
3. AN Mishra, CDGI

Trade Union

1. Irfan Rahi, INTUC, 9837108642

Employers

1. Sachin Gupta, Suhag Kanch Udyog, 9837085133
2. Neerav Upadhyay, 9837121698

Workers/Artisans

1. Umesh Sharma

2. J. Singh
3. Suresh Kumar
4. KG Sharma
5. Rajesh Kumar
5. Rajeev Gupta
6. Mohd. Hashim

NGOs

1. Dilip Sevarthi, Vikas Trust, 9412535459
2. Premvir Dev, Vikas Trust, 9412301674

District Administration

1. Madhur Singh, ALC Firozabad
2. Kalpana Srivastava, ALC Firozabad
3. JL Saroj, DIC Firozabad
4. Motilal, DIC Firozabad

Workshop Facilitators

1. Reshmi Dey, Glass Expert, ILO Consultant
2. Akhilesh Kumar Tewari, National Technical Expert, ILO

COMPETENCY-BASED MODULAR EMPLOYABLE SKILLS (MES)

Level 1:

Course Curricula: Design with Glass (Assistant)

Code: GLW102

Sector: Glassware

Age: 14 years

Entry Requirements: Functionally literate in local language (Hindi – for the pilot project)
Should not be colour blind

Terminal Competency: To achieve a qualification at this level the trained person must demonstrate competency in the following:

Basic Common Competencies:

5. Differentiate between various types of glass products according to (a) quality of glass, (b) methods of manufacturing of product, and (c) usage.
6. Differentiate between various shades of a colour.
7. Measure glass and other materials using different units of measurement (of distance – length, breadth, width; of area, of volume etc).
8. Safely and correctly operate equipment, tools, and handle raw materials.

Specific Competencies:

1. Identify and sketch basic shapes accurately
2. Draw underlying shapes comprising design/shape of sample product
3. Mix colours to create new colours
4. Select correct glassmaking techniques (to create basic shapes) as per design requirements

Pathway:

At the completion of the Level 1 Design with Glass qualification, a student may enter the:
Level 2 Design (development) with Glass qualification
Level 1 Kiln-Fused Glassmaking
Level 1 Engraving
Level 1 Lamp work
Level 2 Decoration on glass

Duration:60 hours (3 hrs x 20 days).

Contents: Given below

<i>Practical Competencies</i>	<i>Underpinning Knowledge (Theory)</i> Knowledge in this area is of an introductory nature with minimal analysis.
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Differentiate between various types of glass products according to (a) quality of glass, (b) methods of manufacturing of product, and (c) usage.	Knowledge of characteristics, properties, and usage of soda-potash glass, borosilicate glass, and lead-based glass.
Differentiate between various shades of a colour	Knowledge of various colour names and shades. Must be standardised to a specific palette type (Pantone). Should know about social indications of specific colours.
Measure using different units of measurement (of distance – length, breadth, width; of area, of volume etc)	Knowledge of SI (le Système international d'unités) scale of units, formulae.
Safely and correctly operate equipment, tools, and handle raw materials	Understanding importance of communication, instructions, and specifications given to perform tasks.
Identify and sketch basic shapes accurately	Knowledge of names of basic shapes Knowledge of geometric methods of construction of basic shapes
Draw underlying shapes comprising design/shape of sample product	Knowledge (through practice) of techniques of de-constructing common items into their constituent shapes.
Mix colours to create new colours	Knowledge and practice of techniques of using colour pencils, water colours, crayons. Knowledge of colour mixing techniques.
Select correct glassmaking techniques (to create basic shapes) as per design requirements	Knowledge (through visual demonstration of production proceses) of glassmaking techniques. Knowledge of standardised terminology such as glass compatibility, thermal shock etc.

Assessment: To achieve the terminal competencies the competency based assessment must be demonstrated against the performance criteria detailed in each terminal competency.

Resources:

- Wooden table and chair
- Sketch pad

- Various types of sketch pencils, colour pencils, and erasers
- Tracing paper
- Computer with internet connection
- Samples of soda glass, potash glass, lead-based glass, flat glass, glass rods/pipes
- Measurement tools – tape measure, scale, weighing scale
- Scissor and cardboard (for mould-making)
- Blackboard/whiteboard
- Palette shade card
- Design books
- Samples of various decorative items
- Basic shapes and design products based on those shapes (in glass and other materials)
- Safety equipment (first-aid kit, gloves etc.)

Terminal Competency: Differentiate between various types of glass products according to (a) quality of glass, (b) methods of manufacturing of product, and (c) usage.

Element	Performance Criteria
3. Differentiate glass based on quality	<ul style="list-style-type: none"> ▶ Tap surface of glass and hear quality of the sound ▶ Examine glass carefully to check for presence of cords, bubbles, and stones ▶ Examine shine and transparency of glass
4. Differentiate products based on manufacturing method	<ul style="list-style-type: none"> ▶ Examine both sides of glass surface for uniform smoothness and thickness, and texture ▶ Examine shine and transparency of glass
5. Differentiate products based on usage	<ul style="list-style-type: none"> ▶ Identify different uses for a product ▶ Identify countries where products are more/less used

Terminal Competency: Differentiate between various shades of a colour

Element	Performance Criteria
2. Understanding Pantone Shade Card	<ul style="list-style-type: none"> ▶ Identify colour and related code of various shades of the card system

Terminal Competency: Measure glass using different units of measurement (of distance – length, breadth, width; of area, of volume etc)

Element	Performance Criteria
2. Use scale correctly	<ul style="list-style-type: none"> ▶ View scale reading correctly to avoid parallax error

Terminal Competency: Safely and correctly operate equipment, tools, and handle raw materials

Element	Performance Criteria
2. Observe good	<ul style="list-style-type: none"> ▶ Wear protective spectacles, mask and gloves

personal and workplace safety practices	<ul style="list-style-type: none"> ▶ Communicate clearly when moving with glass ▶ Read safety instructions on tools before using them ▶ Store tools and materials safely when not in use ▶ Maintain and repair tools regularly
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Terminal Competency: Identify and sketch basic shapes accurately

Element	Performance Criteria
1. Identify basic shapes	▶ Correctly identify names and properties of basic shapes
2. Draw basic shapes	<ul style="list-style-type: none"> ▶ Correctly identify basic geometrical equipment (set-squares, protractors, etc.) ▶ Correctly outline processes to draw, using geometric tools, basic shapes

Terminal Competency: Draw underlying shapes comprising design/shape of sample product

Element	Performance Criteria
1. Draw basic shapes	<ul style="list-style-type: none"> ▶ Correctly identify basic geometrical equipment (set-squares, protractors, etc.) ▶ Correctly outline processes to draw, using geometric tools, basic shapes

Terminal Competency: Mix colours to create new colours

Element	Performance Criteria
1. Correctly identify basic colours	▶ Correctly recite names of and colour properties of VIBGYOR
2. Correctly identify colour mixing techniques	▶ Correctly identify various colours that can be made through mixing basic colours.

Terminal Competency: Select correct glassmaking techniques (to create basic shapes) as per design requirements

Element	Performance Criteria
1. Correctly identify glassmaking techniques	<ul style="list-style-type: none"> ▶ Correctly identify steps involved in a particular glassmaking technique ▶ Correctly enumerate items that can be made using particular glassmaking techniques

Technical Workshop for Preparation of Curriculum on Kiln Formed Glass

One day Technical workshop was conducted by the ILO on 27/11/2009 in Hotel Monark in Firozabad to review and finalize the training curriculum with stakeholders. Agenda of the workshop included presentation of the course details, feedback from the participants and group discussions on course details. Following stakeholders participated in the workshop:

TIs/ITCs

1. Udayaveer Singh Yadav, ASHA ITC Firozabad
2. Satish Sharma, ITI Tundla
3. AN Mishra, CDGI

Trade Union

1. Irfan Rahi, INTUC, 9837108642

Employers

1. Sachin Gupta, Suhag Kanch Udyog, 9837085133
2. Neerav Upadhyay, 9837121698

Workers/Artisans

1. Umesh Sharma
2. J. Singh
3. Suresh Kumar
4. KG Sharma
5. Rajesh Kumar
5. Rajeev Gupta
6. Mohd. Hashim

NGOs

1. Dilip Sevarthi, Vikas Trust, 9412535459
2. Premvir Dev, Vikas Trust, 9412301674

District Administration

1. Madhur Singh, ALC Firozabad
2. Kalpana Srivastava, ALC Firozabad
3. JL Saroj, DIC Firozabad
4. Motilal, DIC Firozabad

Workshop Facilitators

3. Reshmi Dey, Glass Expert, ILO Consultant
4. Akhilesh Kumar Tewari, National Technical Expert, ILO

Module-1

1. Name of the Module : **Glass Batch Maker**
2. Sector : GlassWare
3. Code : **GLW 103**
4. Entry Qualification : Minimum 6th Standard
5. Age : 15 yrs.
6. Terminal Competency : After completion of training the participant would be able to:
 a) Make proper utilization of raw materials
 b) Maintaining Housekeeping
 c) Processing the crushing & sorting the cullet
 d) Maintaining the safety & precautions taken
 e) Mixing of materials with Cullet to make batch
7. Duration : 60 hrs.
8. Contents :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate use of different raw materials in Glass Industry with use of different hand Tools/ equipments.	1	Knowledge about Glass & its Industrial uses. Knowledge of different raw materials used in Glass Industry.
2	Practice to Sieve the glass with different process.	2	Introduction to Sieve Nos & its brief description. Knowledge of differentiate between Laboratory Scale & Industrial Scale.
3	Practice to use the Sieves in Laboratory Scale.	3	Knowledge of selection the Sieves:- As per oversize grains & undersize grains.
4	Practice to use the Sieves in Industrial Scale.	4	Knowledge of Safety aspects of Sieving process.
5	Practice by Magnetic Separation.	5	Knowledge of Magnetic process.
6	Practice Magnetic Separation the Sieves.	6	Knowledge of separation the Sieves by Magnetic process.
7	Practice Washing & Drying of sand by Laboratory Scale.	7	Knowledge of Washing & Drying of sand.
8	Practice on handling the Cullet. Maintain the safety aspects of Cullet handling.	8	Knowledge about Cullet. Process of handling of Cullet. Knowledge of Safety aspects of Cullet handling.

9	Practice sorting of cullet & storing.	9	Knowledge of process of Sorting the Cullet & their Storing..
10	Practice crushing the Cullet.	10	Knowledge about Crushing operation of Cullet.
11	Practice crushing the Cullet with requisite precautions.	11	Knowledge of Safety aspects of Cullet crushing.
12	Practice to mix the raw materials & Cullet as per weight to make Batch.	12	Calculation of area, volume, weight , density & specific gravity, Knowledge of proportionate weight of Cullet & other raw materials & proper mixing with precautions..
13	Checking & Testing of Glass Batch		
14	Project work on one item.		
15	Revision of previous works.		
16	Test.		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Crushing machine	1 no
2	Hammer(Copper)	8 nos
3	Tongs	8 nos
4	Basket	4 nos
5	Ball peen hammer	8 nos
6	Cross peen hammer,	8 nos
7	D/E spanner	2 sets
8	Screw driver	8 nos
9	Steel rule	8 nos
10	Grease gun	8 nos
11	Chisel	8 nos
12	Oil cane	8 nos
13	Pliers	8 nos
14	Goggles(Fiber plastic cup)	16 pairs
15	Hand gloves	16 nos
17	Safety shoes	16 pairs
18	Fire Extinguisher	1 no
19	Adjustable wrench	1 no
20	Balance	1 no

Module-11

1. Name of the Module : **Glass Ball Maker**
2. Sector : Glass Ware
3. Code : **GLW 104**
4. Entry Qualification : Minimum 8th Standard
5. Age : 15 yrs.
6. Terminal Competency : After completion of training the participant would be able to:-
a) Different nature of molten glass
b) Transfer the molten glass to make different items.
d) Receive Glass Gob from Glass Gatherer & make Glass Ball for onward process
7. Duration : 96 hrs.
8. Contents :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate the different nature of molten glasses.	1	Knowledge of different molten glass.
2	Demonstrate to use different Instruments to take measurements of molten glass.	2	Knowledge about Heat, Temperature, pressure, viscosity, surface tension boiling point, melting point, Boils law, Charles law etc & calculates the temperature, pressure, Boils & Charles Law etc. Knowledge about boiling & melting points of Glass & to measure by Instruments.
3	Practice to use the Instruments to measure the Viscosity & Surface tension of molten glass.	3	Knowledge of Viscosity & Surface tension of Glass & Instruments used.
4	Demonstrate movement the molten Glass.	4	Knowledge for movements of molten Glass under gravity.
5	Demonstrate movement of molten Glass on rotation.	5	Knowledge of rotation on movement the molten Glass & its effects.
6	Demonstrate variation of Viscosity of Glass with Temperature.	6	Knowledge about variation of Viscosity of Glass with Temperature.
7	Practice on Glass gathering & Gob transfer.	7	Knowledge about working range of Temperature.
8	Practice to make the Ball by rotating the molten Glass with Safety &	8	Knowledge of Gathering Temperature, Glass Gathering Rods/ pipes.

	Precautions taken.		
9	Precautions taken at the time gathering glass.	9	Knowledge of safety at the time gathering glass.
10	Checking & Testing of glass Ball.	10	Knowledge of gathering the Glass & transfer to Gob.
11	Project work on one item.		
12	Revision of previous works.		
13	Test.		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Ball peen hammer	1 no
2	Cross peen hammer,	8 nos
3	D/E spanner	2 sets
4	Screw driver	4 nos
5	Steel rule	8 nos
6	Grease gun	8 nos
7	Chisel	8 nos
8	Oil can	8 nos
9	Glass Gathering pipes	8 nos
10	Glass Gathering Rods	8 nos
11	Pliers	8 nos
12	Goggles(Fiber plastic cup)	16 nos
13	Hand gloves	16 pairs
14	Safety shoes	16 pairs
15	Fire Extinguisher	1 no
16	Adjustable wrench	1 no
17	Viscosity Meter	2 nos
18	Thermometer	4 nos
19	Pressure Gauge	4 nos
20	Furnace	1 no

Module-111

1. Name of the Module : **Glass Cutting& Polishing**
2. Sector : GlassWare
3. Code : **GLW 205**
4. Entry Qualification : Minimum 12th Standard or 8th pass & completed GLW103 or GLW104
5. Age : 15 yrs.
6. Terminal Competency : After completion of training the participant would be able to:
a) Cutting the glass by hand as per dimensions
b) Polishing the glass by manual process
c) Operate different M/C's used for glass Cutting & Polishing
7. Duration : 64 hrs.

8. Contents :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate use of hand Tools in appropriate works.	1	Knowledge of Hand Tools :- Ball peen hammer, Cross peen hammer, Diamond wheel dresser, D/E spanner, Screw driver, Steel rule, Grease gun, Chisel, Oil can, Table lamp etc.
2	Demonstrate to operate the glass cutting m/c & cut the glass in required size.	2	Knowledge of glass cutting m/c and its nomenclature.
3	Practice to operate the Marking m/c & put marks the Glass as appropriate size.	3	Knowledge of Marking m/c and its nomenclature.
4	Practice to operate the Drilling m/c & drill the Glass as appropriate place.	4	Knowledge of Drilling m/c and its nomenclature.
5	Practice Cutting, Marking & Drilling the Glass by m/cs.	5	Knowledge of Polishing & their compounds.
6	Practice to operate the Polishing m/c.	6	Knowledge of Polishing m/c and its nomenclature.
7	Practice to operate the Bench Grinding m/c.	7	Knowledge of Bench Grinding m/c and its nomenclature.
8	Practice to dresses the grinding wheel & properly fitted in m/c.	8	Knowledge of Grinding Wheels and briefly describe the different grades.
9	Practice grinding & polishing in Flat leveling m/c.	9	Knowledge of Flat leveling m/c and its nomenclature.

10	Use of coolant & Lubricant.	10	Knowledge of Coolant & Lubricant.
11	Practice on packaging & storing.	11	Method of proper packaging of finished products & proper storing. Concept of Quality assurance. Quality/Checking/Testing of different Glass Cutting & Polishing.
12	Survey the marketing system.	12	Knowledge of transportation & marketing. Concept of sales services. Calculation of cost of finished Products.
13	Project Works on Glass Cutting & Polishing		
14	Revision & Test		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Ball peen hammer	1 no
2	Cross peen hammer	8 nos
3	Diamond wheel dressing	8 nos
4	D/E spanner	2 sets
5	Screw driver	8 nos
6	Steel rule	8 nos
7	Grease gun	8 nos
8	Chisel	8 nos
9	Oil can	8 nos
10	Table lamp	4 nos
11	Grinding Wheels	4 nos
12	Pliers	8 nos
13	Goggles(Fiber plastic cup)	16 nos
14	Hand gloves	16 pairs
15	Safety shoes	16 pairs
16	Fire Extinguisher	1 no
17	Adjustable wrench	1 no
18	Glass cutting machine	1 no
19	Glass marking machine	1 no
20	Glass polishing machine	1 no
21	Drill machine	1 no
22	Bench Grinding machine	1 no

Module-IV

1. Name of the Module : **Glass Painting**
2. Sector : Glass Ware
3. Code : **GLW 206**
4. Entry Qualification : Minimum 12th Standard or 8th pass & completed GLW103 or GLW104
5. Age : 15 yrs.
6. Terminal Competency : After completion of this training the participant would be able to:
a) Applicability of different Colour paints on glass
b) Knowledge of different m/c's for Colour paints
7. Duration : 40 hrs.
8. Contents :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate the applicability of different Colour paints on glass.	1	Knowledge of different Colour paints & Chemical Composition.
2	Practice the different paints on Glass.	2	Knowledge of different Glass painting.
3	Precautions taken at the time of painting & Screen making.	3	Knowledge of Safety in painting shop.
4	Practice the applicability of different hand Tools & apparatus in Glass painting shop.	4	Knowledge of different hand Tools & apparatus used in Glass painting shop.
5	Practice to operate the Marking m/c & put marks on Glass as per appropriate size.	5	Knowledge of Marking m/c and its nomenclature.
6	Practice to operate the spray painting gun.	6	Knowledge of spray painting gun & its nomenclature.
7	Practice to operate the painting m/c.	7	Knowledge of Painting m/c for both round & flat jobs & its nomenclature.
8	Practice to paint the different Glasses with proper use of paints, Tools, Apparatus & machineries.	8	Knowledge of different painting brush.
9	Demonstration & use of Electric Oven in glass painting shop.	9	Knowledge of Electric Oven & its control.
10	Practice on packaging & storing.	10	Method of proper packaging of finished products & proper storing. Concept of Quality assurance.

			Quality/Checking/Testing of different Glass Painting.
11	Survey the marketing system.	11	Knowledge of transportation & marketing. Concept of sales services. Calculation of cost of finished Products.
12	Project Works on Glass Painting		
13	Revision		
14	Test		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	D.E. Spanner	1 set
2	Hammer Ball peen	4 nos
3	Hammer Cross peen	4 nos
4	Spray painting gun	4 nos
5	Painting brush	As require
6	Painting m/c	1 no
7	Marking m/c	1 no
8	Different paints	As require
9	Screw Driver	8 nos
10	Pliers	8 nos
11	Goggles(Fiber plastic cup)	16 nos
12	Hand gloves	16 pairs
13	Safety shoes	16 pairs
14	Fire Extinguisher	1 no
15	Adjustable wrench	1 no
16	Electric Oven	1 no

Module-V

1. Name of the Module : **Glass Toy making**
2. Sector : Glass Ware
3. Code : **GLW 207**
4. Entry Qualification : Minimum 12th Standard
5. Age : 17 yrs.
6. Terminal Competency : After completion of this training the participant would be able to:
a) Able to design the various Glass toys by CAD.
b) Operate the different M/C's to make toys.
c) Make different type glass Toys
7. Duration : 480 hrs.
8. **Contents** :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate to know the Scientific glass & Ordinary glass.	1	Knowledge of Scientific Glass & Ordinary Glass and their differences.
2	Demonstrate to use the hollow glass rods & solid glass rods.	2	Known to use the hollow glass rods & solid glass rods.
3	Demonstrate to use the hand Tools in appropriate works.	3	Knowledge of different types Hand Tools: - Carbon rods, carbon plate, stop cork holder, mouth holder, mouth plug, steel rule etc.
4	Practice to operate different gas regulator & use of burner.	4	Knowledge of different types of LPG & Oxygen gas regulator. Knowledge of table glass burner.
5	Practice to operate the Air Compressor m/c.	5	Knowledge of Air Compressor m/c and its nomenclature.
6	Practice of different fittings with table glass burner and other machineries & equipments.	6	Knowledge of fittings of G.I pipe & rubber pipe with table glass burner and other machineries & equipments.
7	Demonstrate to operate the glass cutting m/c & Practice to cut the glass in required size.	7	Knowledge of glass cutting m/c and its nomenclature. Knowledge of safety & Precautions taken.
8	Practice to operate the Bench type Grinding m/c.	8	Knowledge of Bench type Grinding m/c and its nomenclature.
9	Practice to dresses the grinding wheel & properly fitted in m/c.	9	Knowledge of Grinding Wheels and briefly describe the different grades.
10	Practice to blow the glass in different	10	Knowledge of Glass Blowing & apparatus

	shape with the use of apparatus.		use.
11	Practice to operate the Pantograph m/c.	11	Knowledge of Pantograph m/c and its nomenclature.
12	Practice to operate the Graudgeation m/c.	12	Knowledge of Graudgeation m/c and its nomenclature.
13	Designing the different Glass Toys like Camel, deer, elephant, eagle, different types of dolls etc.	13	Knowledge of designing the different Glass toys.
14	Practice to operate the Computer-WINDOWS – XP, MS office – XP etc.	14	Knowledge on computer operating.
15	Demonstration & practice on CAD. Designing the different Toys by applying CAD.	15	Knowledge on computer aided design. Knowledge of other soft ware packages link with Toys manufacturing.
16	Practice to make different types of Glass Toys with the use of adequate Tools, Instruments, Accessories & Equipments.	16	Knowledge of different types Glass Toys & manufacturing process (Sequence) :- Camel, deer, elephant, eagle, different types of dolls etc.
17	Quality/Checking/Testing of different Glass Toys by materials, shape & measurement & weight. Practice on packaging & storing.	17	Concept of Quality assurance. Method of proper packaging of finished products & proper storing.
18	Practice: - Internet & E-mail for marketing (both National & International). Practice:-CRM-Marketing & soft skill, leader ship, problem solving, decision making skill etc.	18	Knowledge of transportation & marketing. Concept of sales services. Calculation of cost of finished Products. Use of Internet & E-mail for marketing (both National & International). Knowledge of CRM.(Consumer related management)- Marketing & soft skill, leader ship, problem solving, decision making skill etc.
19	Project Works individually to make different Glass Toys.		
20	Revision		
21	Test		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Carbon rods	As require
2	carbon plate	As require
3	stop cork holder	As require
4	mouth holder	As require
5	mouth plug	As require
6	steel rule	8 nos

7	LPG gas regulator	1 no
8	Oxygen gas regulator	1 no
9	Table glass burner	1 no
10	Pantograph m/c	1 no
11	Graudegation m/c	1 no
12	Bench type Grinding m/c	1 no
13	Pentium - IV or latest version computer with all necessary accessories	04 Nos.
14	132 column dot matrix printer (latest version)	01 NO.
15	Laser printer	01 NO.
16	5 kVA on line UPS with 30 mins. back up	01 NO.

SOFTWARE:-

17	Noval Netware (latest version)	01 NO.
18	WINDOWS - XP	01 NO.
19	MS office - XP	01 NO.
20	Auto CAD (latest version)	01 NO.
21	Software package for Toys design (latest version)	01 NO

Module-V1

1. Name of the Module : **Sand Blasting of Glass**
2. Sector : Glass Ware
3. Code : **GLW 308**
4. Entry Qualification : Minimum 12th Standard or 8th pass & completed GLW 103 or GLW 104
5. Age : 17 yrs.
6. Terminal Competency : After completion of this training the participant would be able to:
a) Known the blasting process
c) Known the sand blasting chamber
7. Duration : 64 hrs.
8. Contents :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate processing of sand blasting.	1	Knowledge of sand blasting process.
2	Demonstrate the function of sand blasting chamber.	2	Knowledge of Sand Blasting Chamber & description of its parts & every Section.
3	Practice to operate the Sand Blasting Gun.	3	Knowledge of Sand Blasting Gun & its nomenclature.
4	Demonstrate the function of Electric Oven & its temperature control.	4	Knowledge of Electric Oven & its temperature control.
5	Practice to operate the Air Compressor m/c.	5	Knowledge of Air Compressor m/c and its nomenclature.
6	Demonstrate the function of A.C.m/c	6	Knowledge of different type A.C. (Window type) m/c.
7	Precautions taken at the time of Blasting in Chamber.	7	Knowledge of maintains Safety in Sand Blasting Chamber.
8	Project Works on Glass Cutting & Polishing		
9	Revision		
10	Test		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Sand Blasting Gun	4 nos
2	Air Compressor m/c	1 no
3	A.C. (Window type) m/c.	1 no
4	Ball peen hammer	8 nos
5	Cross peen hammer	8 nos
6	Diamond wheel dresser	4 nos
7	D/E spanner	2 sets
8	Screw driver	4 nos
9	Steel rule	4 nos
10	Grease gun	2 nos
11	Chisel	4 nos
12	Oil can	4 nos
13	Table lamp	4 nos
14	Pliers	8 nos
15	Goggles(Fiber plastic cup)	16 nos
16	Hand gloves	16 nos
17	Safety shoes	16 pairs
18	Fire Extinguisher	1 no
19	Adjustable wrench	1 no
20	Sand Blasting Chamber	1 no

Module-VII

1. Name of the Module : **Annealing Oven / Lehr Operator**
2. Sector : Glass Ware
3. Code : **GLW 309**
4. Entry Qualification : Minimum 12th Standard or 8th pass & completed GLW 103 or GLW 104
5. Age : 17 yrs.
6. Terminal Competency : After completion of this training the participant would be able to:
a) Operate the Annealing Oven / Annealing Lehr
b) Guide & Control Loading & unloading of Glassware
7. Duration : 64 hrs.
8. **Contents** :

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate the function of Annealing Ovens & Lehrs.	1	Knowledge of Annealing Ovens & Lehrs.
2	Practice Annealing & process of Annealing Cycle.	2	Knowledge of Annealing & Process of Annealing Cycle.
3	Demonstrate & practice to operate with controlling the Annealing Oven & Lehrs.	3	Knowledge of controlling the Annealing Ovens & Lehrs.
4	Demonstrate & practice of loading & unloading of Glass Ware.	4	Knowledge of Loading & Unloading of Glass Ware.
5	Demonstrate the effective Deviation from Annealing Cycle and find out the remedies.	5	Knowledge of effect for deviation from Annealing Cycle & its remedies.
6	Project work on one item.		
7	Revision of previous works.		
8	Test.		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Ball peen hammer	8 nos
2	Cross peen hammer	8 nos
3	Diamond wheel dresser	4 nos
4	D/E spanner	2 sets
5	Screw driver	4 nos
6	Steel rule	4 nos
7	Grease gun	4 nos
8	Chisel	4 nos
9	Oil can	2 nos
10	Table lamp	4 nos
11	Pliers	4 nos
12	Goggles(Fiber plastic cup)	4 nos
13	Hand gloves	16 pairs
14	Safety shoes	16 pairs
15	Fire Extinguisher	1 no
16	Adjustable wrench	1 no
17	Annealing Oven & Lehr	1 no

Level-3
Module-VIII

1. Name of the Module : **Glass Furnace Operator**
2. Sector : Glass Ware
3. Code : **GLW 310**
4. Entry Qualification : Minimum 12th Standard or 8th pass & completed GLW 103 or GLW 104
5. Age : 17 yrs.
6. Terminal Competency : After completion of this training the Participant would be able to:
a) Supervise Batch Charging
b) Operate the Combustion system & run Furnace
c) Maintain the Log Book
7. Duration : 192 hrs.
8. Contents :

PART-1

	Demonstrate:-
1	The utility of different raw materials in Glass Industry.
2	How to use the Sieve with the utility of Accessories.
3	How to Use of Sieves in Laboratory & Industrial Scale.
4	Washing & Drying of sand by Laboratory Scale.
5	Demonstrate of Magnetic Separation, sorting & Crushing of cullet & storing.
6	Mixing of raw materials & Cullet as per weight to make Batch.

The above course may be arranged for 16 hrs for fresher Candidates which may be including in duration of 192 hrs.

PART-11

SL.NO	PRACTICAL	SL.NO	THEORY
1	Demonstrate Batch type Glass Melting Furnaces.	1	Knowledge of Batch type Glass Melting Furnaces.
2	Demonstrate Batch Charging in Furnace.	2	Process of Batch Charging in Furnace.
3	Demonstrate Glass Melting in Furnace.	3	Process of Glass Melting in Furnace.
4	Demonstrate Combustion process.	4	Knowledge of Fuels & Combustion.
5	Demonstrate Combustion system operation with Safety aspects.	5	Knowledge of Combustion system operation with Safety aspects.

6	Practice to take measure different temperatures of melting Glass by proper Instruments.	6	Knowledge of different temperatures of melting Glass & its measure by proper Instruments.
7	Practice to check the Furnace pressure with Instruments.	7	Knowledge of Furnace pressure & Instruments used.
8	Practice to maintain the Temperature Cycle in Furnace.	8	Knowledge of Temperature Cycle in Furnace.
9	Demonstrate to make Furnace with Refractory materials.	9	Knowledge of Furnace Structure and Refractory materials.
10	Demonstrate the Furnace operation with Control.	10	Knowledge of Furnace Operation & its Control.
11	Demonstrate Heat up & Cool down in Furnace.	11	Knowledge of Heat up & Cool down in Furnace.
12	Demonstrate Glass Melting pots including its handling, heat up & transfer.	12	Knowledge of Glass Melting pots including its handling, heat up & transfer.
13	Demonstrate to operate the Auxiliary Furnaces.	13	Knowledge of Auxiliary Furnaces.
14	Practice Log Book maintenance.	14	Knowledge of Log Book and its maintenance.
15	Checking & Testing of Glass		
16	Project work on one item.		
17	Revision of previous works.		
18	Test.		

Lists of Tools & Equipments for a batch of 16 trainees

SL.NO	DESCRIPTION OF TOOLS	QUANTITY
1	Ball peen hammer	8 nos
2	Cross peen hammer	8 nos
3	Diamond wheel dresser	4 nos
4	D/E spanner	2 sets
5	Screw driver	4 nos
6	Steel rule	4 nos
7	Grease gun	4 nos
8	Chisel	4 nos
9	Oil can	2 nos
10	Table lamp	4 nos
11	Pliers	4 nos
12	Goggles(Fiber plastic cup)	4 nos
13	Hand gloves	16 pairs
14	Safety shoes	16 pairs
15	Fire Extinguisher	1 no
16	Adjustable wrench	1 no
17	Furnace	1 no