

**CURRICULUM**

**FOR THE TRADE OF**

**Cold Chain Engineering and  
Equipment Maintenance**

(Cold Chain Logistics – Engineering)

**UNDER**

**APPRENTICESHIP TRAINING SCHEME**



सत्यमेव जयते

**GOVERNMENT OF INDIA**

**MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP**

**DIRECTORATE GENERAL OF TRAINING**

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## 1. ACKNOWLEDGEMENT

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1. Delhi Cold Storage
2. Hans seeds
3. Ketki Ice & Cold Storage
4. Siddhi Enterprises
5. M J Logistics

## 2. BACKGROUND

### 2.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate (ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are five categories of apprentices namely; **trade apprentice, optional trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of trade apprentices and optional trade apprentices vary from trade to trade. The apprenticeship training consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year.

Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

## **2.2 Changes in Industrial Scenario**

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

## **2.3 Reformation**

The Apprentices Act, 1961 has been amended and brought into effect from 22<sup>nd</sup> December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

### **3. RATIONALE**

This candidate trained in the job role will be employed in the maintenance department to perform the engineering and equipment maintenance. Maintenance activity is of refrigeration equipment like evaporator, condenser, compressor, etc. The person handles the service and repair of the equipment. Engineering is about energy efficiency in the cold chain, modified temperature and effluent treatment. Each of these persons has a specific job with different job titles for engineering and maintenance with different importance for the jobs:

1. The greater degree of relevance of the training with latest advancements of the industry will enhance the employability opportunities.
2. Products stored under refrigeration and equipment components should meet the quality requirements.
3. Able to complete the maintenance activities on time
4. Handle different components of refrigeration equipment like evaporator, compressor and condenser
5. Able to complete maintenance activities within the costs planned
6. Able to use the computer knowledge for electronic documentation where required
7. Exposure to legislative laws, organizational requirements and environment
8. Able to communicate and behave in a professional manner when dealing with customers, colleagues and supervisors
9. Knowledge of Risk and impact of not following defined procedures/work instructions.
10. Assess what is to be done to resolve in case of any issue
11. Able to understand clearly and gaining extensive knowledge of the company, services offered and related solutions to problems.
12. Exposure to Reporting and documentation.

13. Ability to understand and maintain health, safety and security standards during maintenance activities
14. Knowledge on hazardous effects of refrigerants to the environment
15. Usage of appropriate tools and techniques while handling repairs of evaporators, condensers or compressors
16. Numerical calculations or data entry mechanisms as required for the activities
17. Importance of prior planning of preventive maintenance
18. Applications and effects of different refrigerants
19. Methods for safe use of refrigerants
20. Energy consumption and parameters
21. Knowledge on ideal temperature ranges, composition of gases and proper sanitation
22. Water and effluent treatment procedures

## 4. JOB ROLE

### **Brief description of Job role:**

The process is about maintenance of refrigeration equipment like evaporator, condenser and compressor. It is also about handling service and repair of refrigeration equipment. The activity is to be performed as per scheduled checklist.

Maintenance of refrigeration equipment has to ensure timely activity and within the costs. The activity should be performed by wearing appropriate protective gears. Usage of necessary tools and equipment is essential. Post the activity, the area should be kept clean and safe. The job role is required to follow safety and hygiene procedures. The standard operating procedures are to be followed. The quality aspects should be met for products stored under refrigeration and equipment components.

The engineering involves energy efficiency maintenance by efficient energy use. It involves maintenance of equipment for temperature and storage conditions. Performs water and effluent treatment in the plant ensuring control systems of the refrigeration system components



## 5. LEARNING OUTCOMES

### A. GENERIC OUTCOME

- Recognize & comply safe working practices, environment regulation and housekeeping.
- Work in a team, understand and practice soft skills, technical English to communicate with required clarity.
- Illustrate concept and principles of basic arithmetic calculation, algebraic, trigonometric, statistics and apply knowledge of specific area to perform practical operations which requires well developed skills.
- Explain basic science in the field of study including basic electrical, and hydraulics & pneumatics.
- Read and apply engineering drawing for different application in the field of work.
- Explain the knowledge of general concept, principles of productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
- Explain the general concept and process of energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
- Explain and display sensitivity towards personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
- Apply the general concept of basic computer, basic operating system and uses of internet services to take benefit of IT developments in the industry

## **B. SPECIFIC OUTCOME**

- Explain how to perform engineering and equipment maintenance activity in cold chain unit.
- Apply knowledge of safely performing the activity ensuring timeline and cost.
- Apply computer knowledge for electronic documentation of information if required
- Prioritize the schedule obtained and plan every day without any delays.
- Understand the technical specification, which helps during engineering and equipment maintenance activity
- Exposure to legislative laws, organizational requirements, resources and environment
- Plan and organize assigned work.
- Detect & resolve issues during engineering and equipment maintenance activities
- Communicate with required clarity.
- Schedule seasonal maintenance

## 6. GENERAL INFORMATION

1. Name of the Trade : **Cold Chain Engineering & Equipment Maintenance  
(Cold Chain – Engineering)**

2. Duration of Apprenticeship Training : **15 Months**  
(i) Basic Training : 03 Months  
(ii) Practical Training : 12 Months

3. Duration of Basic Training : 03 months

4. Duration of Practical Training: 12 Months

5. Entry Qualification : Passed 12<sup>th</sup> class  
examination under 10+2  
system of education or  
its equivalent.

6. Selection of Apprentices : The apprentices will be  
selected as per the  
Apprentices Act amended  
time to time

7. Rebate: Trainee pass-outs from PMKVY or MES-SDI

or

Any central Government/state government approved scheme in  
course/trade/module relevant to the proposed optional trade.

**Note:** Industry may impart training as per above time schedule, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspect is compromised and duration of industry training to be remains as 1 year.

## 7. COURSE STRUCTURE

Training duration details: -

| Time<br>(in months)                       | 1-3      | 4-15       |
|---|----------|------------|
| Basic Training                            | Block- I | -----      |
| Practical Training<br>(On - job training) | ----     | Block - II |

| Components of Training           | Duration of Training in Months |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|----------------------------------|--------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|                                  | 1                              | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Basic Training<br>Block - I      |                                |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
| Practical Training<br>Block - II |                                |   |   |   |   |   |   |   |   |    |    |    |    |    |    |

## 8. SYLLABUS

### 8.1 BASIC TRAINING (BLOCK – I)

DURATION : 03 MONTHS

#### GENERAL INFORMATION

1.Name of the Trade : **Cold Chain Engineering &Equipment Maintenance (Cold Chain– Engineering)**

2.Name of the subject :**Professional Skills and Professional knowledge (Trade Practical and Trade Theory )**

3.Hours of Instruction : 395 Hrs (275 + 120)

4.Batch size : 30

1. Power Norms : 4 KW

2. Space Norms : 25 Sq. m

3. Examination :i) The internal assessment will be held on completion of the Block.

ii) LSC will be conducting exam at the end of BasicTraining.

4. Instructor Qualification:

- **Degree / Diploma in Mechanical Engineering. From recognized university/Board with one/two-year post qualification experience respectively in the relevant field.**

5. Tools, Equipment's & Machinery required: - As per Annexure – I

**BASIC TRAINING (BLOCK – I)**  
**Trade: Cold Chain Engineering & Equipment Maintenance**  
**(Cold Chain – Engineering)**

**8.1.1 DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE**

| Sl. No. | Professional Skills<br>(Trade Practical) 270 hrs                                    | Professional Knowledge<br>(Trade Theory) 120 hrs  |
|---------|---|---|
| 1.      | Follow the Safety rules and Procedures and take precautions in the workplace.       | The safety rules and Procedures to be observed by CCE&EM Executive                                    |
| 2       | Explain different type of dangerous goods and associated risks and ways of handling | Different type of dangerous goods and associated risks and ways of handling                           |
| 3       | Follow the Safety rules and Procedure   | Safety rules and Procedures   |
| 4       | Apply SOP and the handling procedure in case of miss-happenings                     | SOP and the handling procedure in case of miss-happenings   |
| 5       | Follow Company safety policy inside the company premises                            | Company safety policy inside the company premises   |
| 6       | Understand the consequences of wrong usage of PPE and use PPE properly.             | Importance of Proper usage of PPE and consequences of wrong usage<br>Details OSHA and its application |
| 7       | Follow OSHA and Implement 5S .  | 5S and its implementation and practice  |
| 8       | Take measures and Maintain Health, Safety and Security during operations            | Health, Safety and Security measures to be carried out/ taken up during operations                    |
| 9       | Watch the Video showing demonstration of handling different accidents               | Video showing demonstration of handling different accidents   |

|     |  |  |
|-----|--|--|
| 10  | <p>Visit a warehouse and Watch the warehousing concept and operations</p> <p>Carryout warehousing operations – 3PL, 4 PL etc.</p>  | <p>Basics of warehousing</p> <p>warehousing concept</p> <p>Types of warehousing operations – 3PL, 4 PL, etc</p>  |
| 11. | <p>Follow healthy /safe work practices and maintain Health, Safety and Security measures While carrying out maintenance activities</p>   | <p>Health, Safety and Security measures to be observed while carrying out the maintenance activities by Field Executive - Custom Clearance</p>   |
| 12  | <p>Explain Basics of cold chain warehousing.</p> <p>Identify difference between a general warehouse and cold chain warehouse.</p> <p>Select Types of cold chain with respect to the requirement for different types of products.</p> <p>Watch Video of cold chain unit and its operation</p>                               | <p>Introduction to cold chain</p> <p>Cold Chain &amp; Its Importance</p> <p>Difference between a general warehouse and cold chain warehouse</p> <p>Types of cold chain with respect to the requirement for different types of products – difference between cold chain warehousing for fruits, staples, liquids, etc.</p> <p>Places where cold chain exist – 3PL warehouse, Internal manufacturing setup, etc.</p> |
| 13. | <p>Carry out activities of cold chain</p> <p>Operate the different types of refrigeration equipment such as condenser, compressor and evaporator, etc. and understand their operational thresholds.</p> <p>Understand types of breakdowns and technical issues associated with the equipment and attend the breakdowns</p> | <p>Activities carried out in cold chain</p> <p>Different types of refrigeration equipment such as condenser, compressor and evaporator, etc.</p> <p>Technical information's on different equipment in terms of their practical usage, their operational thresholds</p> <p>Types of breakdowns and technical issues associated with the equipment</p>   |
| 14. | <p>List Different type of engineering equipment used in cold chain</p> <p>Handle/Operate the different type of engineering equipment available in cold chain.</p> <p>Understand their limitation</p> <p>Watch Video of operation and limitation of different equipment</p>   | <p>Different type of engineering equipment used in cold chain</p> <p>operation and limitation of different equipment</p> <p>Video on operation and limitation of different equipment</p>   |

|      |   |   |
|------|---|---|
| 15.. | <p>Operate the cold chain equipments.</p> <p>Watch Video of cold chain warehouse maintenance operations and perform.</p>  | <p>Procedure to conduct the pre-operation safety drill and checks before starting the equipment.</p> <p>Standard operating procedures for these equipment</p> <p>Steps involved to start the equipment</p> <p>Standard procedures to set the temperature, gas requirements, etc.</p>  |
|      | <p>Make a visit to cold chain and understand the operations and Maintenance activities</p>  | <p>Visit on cold chain to understand the operations and Maintenance activities</p>  |
| 16   | <p>Carry out the maintenance activities of the following/ equipments with necessary precautions</p> <ul style="list-style-type: none"> <li>• electrical systems</li> <li>• Checking of evaporators for defrosting and coil surface for dust accumulation</li> <li>• Checking electrical connections for corroded terminals</li> <li>• Checking oil safety and high pressure control of compressor units</li> <li>• Ensuring working of the equipments under maintenance</li> <li>• Discharging of ammonia safely</li> <li>• The drains in the cold room for free of debris</li> <li>• Checking the working of door seals</li> <li>• Calibrating the equipment before use</li> <li>• Removing or replacing an evaporator or compressor as required</li> <li>• Observing compressor duty</li> </ul> | <p>Visit on cold chain to understand the operations and Maintenance activities</p> <p>Different precautions to be considered while doing maintenance activities of</p> <ul style="list-style-type: none"> <li>• electrical systems</li> <li>• Checking evaporators for defrosting and coil surface for dust accumulation</li> <li>• Checking electrical connections for corroded terminals</li> <li>• Checking oil safety and high pressure control of compressor units</li> <li>• Ensuring working of the equipment</li> <li>• Discharging ammonia</li> <li>• Checking operations of door seals</li> <li>• Calibrating the equipment before use</li> <li>• Removing or replacing an evaporator or compressor as on when required</li> <li>• Observing compressor duty cycle, for condensation or presence of ice for freezer insulation degradation</li> </ul> |



|     |  |  |
|-----|--|--|
|     | <p>cycle, condensation or presence of ice for freezer insulation degradation</p> <ul style="list-style-type: none"> <li>• defrost system and thermostat</li> <li>• Repairing of thermostat, electrical systems, etc.</li> <li>• Dismantling refrigeration components to trace faults</li> <li>• Checking of components to trace faults and need for service and repair</li> <li>• Reinstating of components into the refrigeration equipment</li> <li>• Circuit diagrams of the refrigeration system</li> <li>• water and effluent treatment plant</li> <li>• Modified atmosphere temperature maintenance</li> </ul> | <ul style="list-style-type: none"> <li>• Operating defrost system and thermostat</li> <li>• Repairing thermostat, electrical systems, etc.</li> <li>• Dismantling refrigeration components to trace faults</li> <li>• Inspection of components to trace faults and need for service and repair</li> <li>• Reinstating of components into the refrigeration equipment</li> <li>• Handling circuit diagrams of the refrigeration system</li> <li>• Performing water and effluent treatment in the plant</li> <li>• Taking care of modified atmosphere temperature maintenance</li> </ul> |
|     | Make documentation of maintenance activities performed and generate daily report of maintenance checks   | Procedure for documentation of maintenance activities performed and generate daily report for maintenance checks   |
|     | make free the drains in the cold room free of debris   | Steps to make free the drains in the cold room free of debris  |
|     | Ensure energy efficiency and consumption   | Steps to ensure energy efficiency and consumption  |
|     | Raise issues with respect to the equipment that requires additional repairs and Inform the management regarding status of various equipment  | Procedure for raising issues with respect to the equipment that requires additional repairs and Informing management regarding status of various equipment   |
| 17. | Test all lab equipments in batche  | Procedure for testing of lab equipment in batches  |
| 18. | Make reports on paper and in MIS   | Demonstration of different types of reporting on paper and in MIS  |
| 19. | <b>Revision &amp; Internal assessment</b>  |  |

### 8.1.2.1 SYLLABUS FOR WORKSHOP SCIENCE & CALCULATION

Duration – 20 Hrs

|                                  |   |  |
|----------------------------------|---|--|
| <b>Unit</b>                      | : | Systems of unitFPS, CGS, MKS/SI unit, unit of length,Mass and time, Conversion of units  |
| <b>Basic Mathematics</b>         | : | BODMAS rule Fraction-Addition, Subtraction, multiplication and Division-Problem solving, Decimal Addition. Simple calculation using Scientific Calculator.Conversion of Fraction to Decimal and vice versa   |
| <b>Percentage</b>                | : | Introduction, Simple calculation. Changing percentagetofraction and decimal & vice-versa   |
| <b>Material Science</b>          | : | Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy &Insulator. Types of ferrous and Non-ferrous metals. Difference between Ferrous and Nonferrous metals.  |
| <b>Mass, Weight and Density:</b> |   | Mass, Unit of Mass, Weight, difference between mass and weight. Density, unit of density. Relation between mass, weight & density. Simple problems related to mass, weight, and density.   |
| <b>Mensuration</b>               | : | Area and perimeter of square, rectangle, parallelogram, triangle, 13 circle, semi-circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere   |
| <b>Elasticity</b>                | : | Elastic & Plastic material. Stress & strain and their units. Young’s modules. Ultimate stress and breaking stress.   |
| <b>Heat &amp; Temperature</b>    | : | Heat and temperature, their units, difference betweenheat and temperature, boiling point, melting point, Scale of temperature, relation between different scale of temperature. Thermometer, pyrometer. Transmission of heat, conduction, convection, radiation. |
| <b>Basic Electricity</b>         | : | Introduction and use of Electricity. AC, DC &their comparisons. Current, Voltage, Resistance&their Units. Power, Energy & their units. Insulator and conductors & their uses.  |

### 8.1.3 SYLABUS FOR ENGINEERING DRAWING

**Duration: 30 Hours**

**Introduction** to Engineering Drawing and Drawing Instruments: - Conventions - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46- 2003 - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.

**Lines:** - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment

Free hand drawing of - Lines, polygons, ellipse, etc. - geometrical figures and blocks 12 with dimension Transferring measurement from the given object to the free hand sketches.

**Drawing of Geometrical Figures:** Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.

**Sizes and Layout of DrawingSheets** - Selection of sizes - Title Block, its position and content - Item Reference on Drawing Sheet (Item List)

Method of presentation of Engineering Drawing - Pictorial View - Orthographic View - Isometric view

**Drawing of Solid figures** (Cube, Cuboids, Cone) with dimensions.

Free hand Drawing of Solid figures (Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.

**Free Hand sketch of hand tools and measuring tools used in respective trades.**

**Projections:** - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1st angle and 3rd angle projection as per IS specification

Drawing of Orthographic projection in 3rd angle.

## **8.1.2 EMPLOYABILITY SKILLS**

### **GENERAL INFORMATION**

1. Name of the Trade : **Cold Chain Engineering & Equipment Maintenance (Cold Chain –Engineering)**

2. Name of the subject : **Employability Skills**

3. Applicability : **ATS - Mandatory for fresher only**

4. Hours of Instruction : **55 Hrs.**

5. Examination : **The examination will be held at the end of two years Training by NCVT.**

6. Instructor Qualification :

***i) MBA/BBA with two years' experience or graduate in sociology/social welfare/Economics with two years' experience and trained in Employability skills from DGT Institute.***

***And***

***Must have studied in English/Communication Skill and Basic Computer at 12<sup>th</sup> / diploma level***

***OR***

***ii) Existing Social Study Instructor duly trained in Employability Skills from DGT Institute.***

#### 8.1.4. SYLLABUS OF EMPLOYABILITY SKILLS

| Topic No. | Topic   | Duration (in hours) |
|-----------|---|---------------------|
|           | <b>English Literacy</b>   |                     |
| <b>1</b>  | <b>Reading</b><br>Reading and understanding simple sentences about self, work and environment   | <b>8</b>            |
| <b>2</b>  | <b>Writing</b><br>Construction of simple sentences Writing simple English   |                     |
| <b>3</b>  | <b>Speaking / Spoken English</b><br>Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication. |                     |
|           | <b>I.T. Literacy</b>  |                     |
| <b>1</b>  | <b>Basics of Computer</b><br>Introduction, Computer and its applications, Hardware and peripherals, switching on-Starting and shutting down of computer.  | <b>10</b>           |
| <b>2</b>  | <b>Word processing and Worksheet</b><br>Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document.<br>Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets, Use of External memory like pen drive, CD, DVD etc., Use of Common applications.                       |                     |

|          |  |           |
|----------|--|-----------|
| <b>3</b> | <b>Computer Networking and INTERNET</b><br><b>Computer Networking and INTERNET</b> - Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication   |           |
|          | <b>Communication Skill</b>   |           |
| <b>1</b> | <b>Introduction to Communication Skills</b><br>Communication and its importance<br>Principles of Effective communication<br>Types of communication - verbal, non-verbal, written, email, talking on phone.<br>Nonverbal communication -characteristics, Components-Para-language<br>Body - language<br>Barriers to communication and dealing with barriers.<br>Handling nervousness/ discomfort. | <b>8</b>  |
| <b>2</b> | <b>Listening Skills</b><br>Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.<br>Triple- A Listening - Attitude, Attention & Adjustment.<br>Active Listening Skills.  |           |
| <b>3</b> | <b>Motivational Training</b><br>Characteristics Essential to Achieving Success<br>The Power of Positive Attitude<br>Self-awareness<br>Importance of Commitment<br>Ethics and Values<br>Ways to Motivate Oneself<br>Personal Goal setting and Employability Planning.   |           |
| <b>4</b> | <b>Facing Interviews</b><br>Manners, Etiquettes, Dress code for an interview<br>Do's & Don'ts for an interview   |           |
| <b>5</b> | <b>Behavioral Skills</b><br>Problem Solving<br>Confidence Building<br>Attitude   |           |
|          | <b>Entrepreneurship skill</b>  | <b>08</b> |

|   |  |           |
|---|--|-----------|
| 1 | <b>Concept of Entrepreneurship</b><br><b>Entrepreneurship</b> - Enterprises: -Conceptual issue<br>Source of business ideas, Entrepreneurial opportunities, the process of setting up a business.   |           |
| 2 | <b>Institutions Support</b><br>Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme. |           |
|   | <b>Productivity</b>  |           |
| 1 | <b>Productivity</b><br>Definition, Necessity, Meaning of GDP.  |           |
| 2 | <b>Affecting Factors</b><br>Skills, Working Aids, Automation, Environment, Motivation<br>How improves or slows down.   | <b>06</b> |
| 3 | <b>Personal Finance Management</b><br>Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.  |           |
|   | <b>Occupational Safety, Health &amp; Environment Education</b>   |           |
| 1 | <b>Safety &amp; Health</b><br>Introduction to Occupational Safety and Health importance of safety and health at workplace.   |           |
| 2 | <b>Occupational Hazards</b><br>Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards.<br>Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.  | <b>08</b> |
| 3 | <b>Accident &amp; safety</b><br>Basic principles for protective equipment.<br>Accident Prevention techniques - control of accidents and safety measures.   |           |
| 4 | <b>First Aid</b><br>Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person  |           |
|   | <b>Labour Welfare Legislation</b>  | <b>02</b> |

|   |   |           |
|---|---|-----------|
| 1 | <b>Welfare Acts</b><br>Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.   |           |
|   | <b>Quality Tools</b>  |           |
| 1 | <b>Quality Consciousness:</b><br>Meaning of quality, Quality Characteristic   | <b>05</b> |
| 2 | <b>Quality Circles:</b><br>Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles. |           |
| 3 | <b>House Keeping:</b><br>Purpose of Housekeeping, Practice of good Housekeeping.  |           |
| 4 | <b>Quality Tools</b><br>Basic quality tools with a few examples   |           |



## 8.2 PRACTICAL TRAINING (ON-JOB TRAINING)

DURATION: 12 MONTHS

### GENERAL INFORMATION

Name of the Trade : **Cold Chain Engineering & Equipment Maintenance (Cold Chain –Engineering)**

Duration of On-Job Training: As per Apprentices Act amended time to time.

Examination :

- i) The internal assessment will be held on completion of the block
- ii) NCVT exam will be conducted at the end of Apprenticeship Training

Instructor Qualification :

*i) Degree/Diploma in Mechanical Engineering from recognized university/Board with one/two-year post qualification experience in the relevant field.*

**OR**

*ii) LSC approved engineering and maintenance with three-year post qualification experience in the relevant field.*

Infrastructure for On-Job Training: As per Annexure – II

## 8.2.1 Syllabus for Practical Training / On - Job Training

**Duration: 12 months**

- ❖ Familiarization with the industry. Health, Safety & Environment: Introduction to safety Equipment's and their uses. Demonstration of 5S Concept on shop floor. Use of Personal Protective Equipment's (PPE).
- ❖ Prepare different types of documentation as per industrial need using different methods of recording information.
- ❖ Develop good appearance and behavior, practice, tasks as per industry standard and express good communication skill.
- ❖ Prepare and maintain work area and maintain health and safety at the work place.
- ❖ Explain the various activities in Engineering and Equipment Maintenance
- ❖ Understand hygiene and safety aspects
- ❖ Handle different components of refrigeration equipment like evaporator, compressor and condenser
- ❖ Usage of relevant tools and techniques
- ❖ Perform maintenance of electrical systems
- ❖ Check evaporators for defrosting and coil surface for dust accumulation
- ❖ Check electrical connections for corroded terminals
- ❖ Check oil safety and high pressure control of compressor units
- ❖ Perform documentation of maintenance activities performed
- ❖ Ensure working of the equipment
- ❖ Discharge ammonia safely
- ❖ Keep the drains in the cold room must be free of debris
- ❖ Check operations of door seals
- ❖ Calibrate the equipment before use
- ❖ Remove or replace an evaporator or compressor as required
- ❖ Observe compressor duty cycle, condensation or presence of ice for freezer insulation degradation
- ❖ Operate defrost system and thermostat
- ❖ Repair thermostat, electrical systems, etc.
- ❖ Dismantle refrigeration components to trace faults
- ❖ Inspect components to trace faults and need for service and repair

- ❖ Reinstall components into the refrigeration equipment
- ❖ Follow circuit diagrams of the refrigeration system
- ❖ Ensure energy efficiency and consumption
- ❖ Perform water and effluent treatment in the plant.
- ❖ Make free the drains in the cold room free of debris
- ❖ Test all lab equipments in batches
- ❖ Take care of modified atmosphere temperature maintenance
- ❖ Raise issues with respect to the equipment that requires additional repairs
- ❖ Inform the management regarding status of various equipment
- ❖ Document the maintenance activities performed and generate daily report of maintenance checks
- ❖ Make reports on paper and in MIS

## **9. ASSESSMENT STANDARD**

### **Assessment Guideline:**

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarp/wastage as per procedure, behavioral attitude and regularity in training.

### **The following marking pattern to be adopted while assessing:**

- a)** Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.

### **In this work there is evidence of:**

- Engineering and maintenance skill can be easy to understand.
- Overcome of Critical situation it will increase confident level.
- Good level of neatness will give more confident while working.
- Co-ordination of team effort would be useful for completing a project/job easily.

- b)** Weight age in the range of above75%- 90% to be allotted during assessment underfollowing performance level:

For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.

**In this work there is evidence of:**

- Engineering and maintenance skill can be easy to understand.
- Overcome of critical situation will increase confident level.
- Good level of neatness will give more confident while working.

Co-ordination of team effort would be useful for completing a project/job easily.

- c) Weight age in the range of above 90% to be allotted during assessment under following performance level:

For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.

**In this work there is evidence of:**

- Engineering and maintenance skill can be easy to understand.
- Overcome of Critical situation it will increase the confident level.
- Good level of neatness will give more confident while working.
- Co-ordination of team effort would be useful for completing a project/job easily.

## **10.FURTHER LEARNING PATHWAYS**

### **Employment opportunities:**

On successful completion of this course, the candidates may be gainfully employed in the following industries:

1. Warehouses / Stores / Distribution centers / Fulfillment Centre / Mother Hub
2. Courier consolidation Centers
3. Transportation Companies
4. Airports / Air Cargo Terminals / Air Freight Stations
5. CFS / ICDs' / Port Terminals
6. Manufacturing Plants (Automobile / FMCG / Hazardous Goods)

**ANNEXURE – I**

**TOOLS & EQUIPMENTS FOR BASIC TRAINING**

**INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL**

**KNOWLEDGE**

**TRADE: Cold Chain Engineering & Equipment Maintenance**

**(Cold Chain - Maintenance)**

**TRAINEES TOOL KIT: -**

| Sl. No. | Name of the items             | Quantity   |
|---------|-------------------------------|--|
|         |                               | (indicative)                                       |
| 1.      | Safety Shoes                  | 20 pairs   |
| 2.      | Safety Helmet                 | 20   |
| 3.      | Gloves                        | 20 pairs   |
| 4.      | Reflector Jackets             | 20   |
| 5.      | Ear Plugs                     | 20 pairs   |
| 6.      | Industrial Goggles            | 20   |
| 7.      | SOP Charts                    | 20   |
| 8.      | Safety Norms Handbook         | 20   |
| 9.      | Technical specification Sheet | 1 x 5sets<br>(1 each/<br>maintenance<br>activity)  |
| 10.     | Material Safety Data Sheet    | 20   |
| 11.     | DO's and Don'ts Sheet         | 1 x 5 sets<br>(1 each/<br>maintenance<br>activity) |

**Note:** In case of basic training the BTP may hire the Material Handling Equipment if required except if the BTP is the manufacturer of the equipment. Tools, equipment and machinery available in the industry may be used for imparting basic training if the BTP is setup by the Industry

**INFRASTRUCTURE FOR ON-JOB TRAINING**

**Trade : Cold Chain Engineering & Equipment Maintenance  
(Cold Chain - Maintenance)**

Actual training will depend on the existing facilities available in the establishments. However, the industry should ensure that the broad skills defined against On-Job Training part (i.e. 12 months) are imparted. In case of any shortfall, the concerned industry may impart the training in cluster mode/ any other industry to cover up the short fall.



**GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS**

1. Due care to be taken for proper & inclusive delivery among the batch. Some of the following method of delivery may be adopted:
  - A) LECTURE
  - B) LESSON
  - C) DEMONSTRATION
  - D) PRACTICE
  - E) GROUP DISCUSSION
  - F) DISCUSSION WITH PEER GROUP
  - G) PROJECT WORK
  - H) INDUSTRIAL VISIT
  
2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.
  
3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.

**ANNEXURE - IV**

| <b>List of Basic Training providers recommended by LSC</b> |   |                            |
|--|---|----------------------------|
| <b>S.No</b>  | <b>Name of Basic Training Providers</b>                           | <b>Location</b>            |
| 1  | Allcargo Logistics Limited  | Tamil Nadu/Maharashtra     |
| 2  | Alliance Institute of Advanced Pharmaceutical and Health Sciences | Telangana/Andhra Pradesh   |
| 3  | Artem institute of logistics and transports                       | Tamil Nadu                 |
| 4  | Confederation of indian industry(CII) INSTITUTE OF LOGISTICS      | PAN India                  |
| 5  | Daksya Academy Pvt Ltd  | PAN India                  |
| 6  | Darcl Parable   | Haryana                    |
| 7  | De Unique Educational Society (Softdot Institute)                 | PAN India                  |
| 8  | Degain Group  | Maharashtra                |
| 9  | Express Industry Council of India                                 | PAN India                  |
| 10   | Green Earth Logistics Pvt. Ltd.                                   | Tamil Nadu                 |
| 11   | INNOVISION LIMITED  | PAN India                  |
| 12   | JBS Academy Pvt Ltd.  | Gujarat                    |
| 13   | Nidan Technologies Private Limited                                | Maharashtra/Madhya Pradesh |
| 14   | People XL(Jobs connect hr solutions Pvt. Ltd)                     | South India                |
| 15   | Premier Center for Competency Training                            | Tamil Nadu                 |
| 16   | Safeducate Learning Pvt. Ltd.                                     | PAN India                  |
| 17   | Shri Technologies   | PAN India                  |
| 18   | ST.BRITTO'S COLLEGE   | Tamil Nadu                 |
| 19   | SynchroServe Global Solutions Private Limited                     | Telangana/Andhra Pradesh   |
| 20   | Telangana Jagruthi  | Telangana                  |
| 21   | TVS Training & Services Private Limited                           | Tamil Nadu                 |
| 22   | UPDATER SERVICES PVT LTD  | South India                |

**ANNEXURE - V**

| <b>List of Assessment Agency for basic training recommended by LSC</b> |   |                 |
|--|---|-----------------|
| <b>SL.NO</b>   | <b>Name of Assessment Agency</b>                    | <b>Location</b> |
| 1  | Hemsen EXIM LLP                                     | PAN India       |
| 2  | Eduworld Consultants Pvt. Ltd,                      |                 |
| 3  | CII (Confederation of Indian Industry)              |                 |
| 4  | Induslynk Training Services Private Limited (Mettl) |                 |
| 5  | Manipal City & Guilds Pvt Ltd                       |                 |
| 6  | GreenArrows Safety Management (P) Ltd               |                 |
| 7  | I-Vintage solutions Pvt. Ltd.                       |                 |
| 8  | CoCubes Technologies Pvt Ltd                        |                 |
| 9  | Samhit Assessments & research foundation            |                 |
| 10   | Formac Software Services                            |                 |
| 11   | Unison Academy                                      |                 |
| 12   | Prima Competencies Pvt. Ltd                         |                 |
| 13   | Brisk Mind Pvt Ltd                                  |                 |
| 14   | Edu Vantage Pvt. Ltd.                               |                 |
| 15   | Lead Assessment                                     |                 |
| 16   | C & K Management Limited                            |                 |
| 17   | Krish Networks                                      |                 |
| 18   | Society for education and Environmental training    |                 |
| 19   | D'Pariksha  |                 |
| 20   | Anagha Solutions                                    |                 |
| 21   | Ashvi Consulting                                    |                 |
| 22   | Shri Guru Hargovind Society                         |                 |