MECHANIC (COLD STORAGE, ICE PLANT AND ICE CANDY PLANT)

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – SERVICE INCLUDING REPAIR AND MAINTENANCE

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

MECHANIC (COLD STORAGE, ICE PLANT AND ICE CANDY PLANT)

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

ACKNOWLEDGEMENT

The DGT sincerely expresses appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum. Special acknowledgement to the following industries/organizations who have contributed valuable inputs in revising the curricula through their expert members:

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Co-ordinator for the course: Sh. N. Nath, ADT, CSTARI- Kolkata

Sl. No.	Name & Designation Shri/Mr./Ms.	Organization	Mentor Council Designation
Expert group on restructuring of Apprenticeship Training Modules			
1.	S M Jawle,	Godrej India Ltd.	Expert
2.	Unavane V. N.	ITI Anudh, Pune	Expert
3.	S.M. Sawant	ITI Kurla	Expert
4.	D.R. Markandy	BTRI Vile Parle	Expert
5.	D.N. Neogi	Century Rayon Shehad	Expert
6.	Raja Sen,	Century Rayon Shehad	Expert

CONTENTS

1. BACKGROUND

1.1 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 four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices 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.

1.2 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.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd 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.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

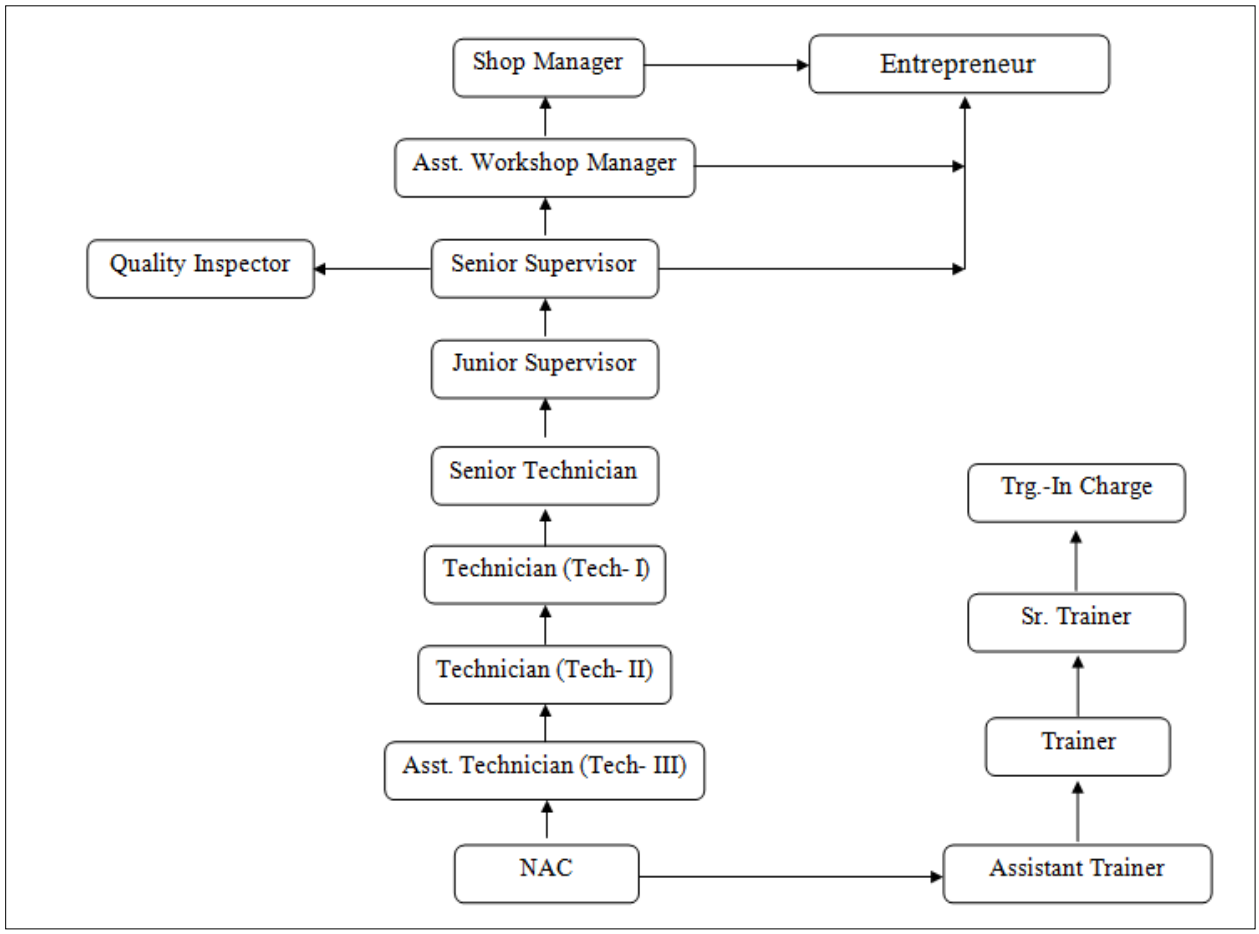
Mechanic (Cold Storage, Ice Plant and Ice Candy Plant) trade under ATS is one of the courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	**Block– I**	**-----**	**Block – II**	**------**
Practical Training (On - job training)	**----**	**Block – I**	**------**	**Block – II**

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)
For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	**For 01 Yr. course**
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	**1000**	**500**

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)
Notional Training Hours for On-Job Training: 3120 Hrs.
For 01 yr. course (Engg.) :-(**Total 12 months**)
Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training

institute have to maintain individual trainee portfolio as detailed in assessment guideline (section-2.4.2). The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline (section-2.4.2) before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 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 should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in 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.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b) Weightage in the range of above75% - 90% to be allotted during assessment	
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.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
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.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Ice-Cream Maker makes ice-cream by mixing milk, sugar and other ingredients and by freezing mixture in freezing machine. Measures and mixes ingredients according to recipe; pasteurizes mixture to eliminate harmful bacteria; pumps ingredients through a homogenizer to break-down butter-fat globules; pours mixture into freezing machine; starts machine to stir and cool mixture; unloads machine when ice-cream of required consistency is obtained; cleans and sterilizes machines, and other equipment with hot water. May form ice-cream into special shapes. May operate ice-block washing machine.

Air-Conditioning and Refrigeration Plant Attendant; Refrigeration System Operator operates air-conditioning or refrigeration system for preserving food, providing cooling or warming media for industrial processes, cooling or warming buildings, or for other purposes. Manipulates various switches, at central control board to start and stop electric motors, pumps, compressors, coolers and other related equipment of refrigeration and air-conditioning system; observes readings in various meters, gauges and instruments regarding temperature, pressure and voltage of system to ascertain working condition of plant; operates switches, thermostats, rheostats and other controls to maintain desired level of temperature; cleans and resets generator brushes, replaces burned fuses and defective devices, thaws frozen valves, cleans equipment and performs other tasks such as oiling, greasing, cleaning of air and water filters etc. to keep system in good running order. May keep records of temperatures produced. May assist Refrigeration Mechanic in dismantling equipment for repairs.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

Reference NCO 2015:

i) 7513.0500 - Ice-Cream Maker
ii) 3132.0900 - Air Conditioning and Refrigeration Plant Attendant

4. NSQF LEVEL COMPLIANCE

NSQF level for Mechanic (Cold Storage, Ice Plant and Ice Candy Plant) trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a) Process
b) professional knowledge,
c) professional skill,
d) core skill and
e) Responsibility.

The Broad Learning outcome of Mechanic (Cold Storage, Ice Plant and Ice Candy Plant) trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	**Mechanic (Cold Storage, Ice Plant and Ice Candy Plant)**
NCO-2015	7513.0500, 3132.0900
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	Passed 10th Class examination under 10+2 system of Education or its equivalent
Selection of Apprentices	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for Basic Training	As per related trade of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for Mechanic (Cold Storage, Ice Plant and Ice Candy Plant) Apprenticeship	**Mechanic (Cold Storage, Ice Plant and Ice Candy Plant)**

Note:

- *Industry may impart training as per above time schedule for different block, 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 aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Mechanic (Cold Storage, Ice Plant and Ice Candy Plant) course of 02 years duration under ATS.

Block I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing- Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Lettering & Numbering, Freehand sketching of Hand tools used for Wireman / Electrician / Lineman trade & wire joints, Signs & symbols for Electrical components used in electrical circuits and AC/DC systems, Electrical wiring diagram of different lamps, Schematic diagram of plate and pipe earthing, insulators used in over head line, Layout diagram of a substation, Single line Diagram of Electrical substation feeders.]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Servicing of cold-store cooling system. Control and Instrument, Operating of cold storage plant

2. Dismantling of commercial type reciprocating compressor, checking component parts.
3. Checking, servicing valve plate and piston assembling, lapping valve plate etc. Fitting and testing
4. Compressor capacity control lubrication system
5. Servicing of water cooled condenser and discaling of condenser Oil separator Non Return Valve, Vibration eliminator & shock absorber
6. Servicing of cooling tower. Its care and maintenance
7. Servicing of water circulating pump
8. Water piping using G.I. steel pipes, Heard copper tubing
9. Test and adjust of refrigerant control devices and safety devices
10. Servicing of extended surface forced Air-evaporators study of servicing of defrost system
11. Servicing of water brine chillers, brine tank
12. Servicing of sub-liquid Heat Exchangers
13. Servicing of electrical controls in cold storage
14. Electrical wiring of compressor and checking the wiring system of plant
15. Pressure testing leak Test evacuation, Gas charging Ammonia and R-22
16. Cold storage plant operation its care and safety
17. Ice plant, trouble shooting servicing testing
18. Repair and maintenance of Ice-candy Plant leak Test, evacuation and Gas charging
19. Retrofitting Ice-Candy plant with alternate non CFC Refrigerant
20. Pump down of cold storage system and ice plant system
21. Servicing of electric control of ice -plant
22. Routine maintenance, overhauling, preventive maintenance of large. Cold storage and ice plants. Maintenance of log book and record keeping.

BLOCK – II

23. Identification of Refrigeration system & components for cold storage, low temperature systems. Identification of pipe fittings & joints, pipe lay out. Safety, fire-fighting equipments & use.
24. Color coding for pipe, water line pipes, chilled water line pipes Refrigerant gas cylinder & their use. Color code & safety code ISI, Specification. Eco-friendly refrigerant. Retrofitting.
25. Cold storage compressor, condenser servicing & maintenance. Treatment of water.
26. Cooling tower & evaporator coil repairing & maintenance. Adjusting & checking all types of expansion valve for correct function.
27. Stripping & assembling of electric motors & panel board interlock wiring. Heat exchanger & surge drum servicing & repairing.
28. Cold storage room/door assembly & leak testing. Cold storage wiring & instrumentation.

29. Installation of complete plant, erection & pipe lay out etc. Electrical wiring & safety.
30. Cold storage plant, putting the plant into operation, trouble shooting on the erected plant, maintenance & testing of plant.
31. Wiring of cold storage, installation work of cold storage & testing of air leakage.
32. Care & maintenance of cold storage plant. Reading lay out drawing of cold storage plant, their insulation & cooling arrangement.
33. Cold storage overhauling & repair of plant, install, check different type of instruments, controls & electrical wiring.
34. Cold storage repair of compressor and auxiliary equipment at site.
35. Ice plant wiring testing, prepare brine, measure density.
36. Ice plant testing for performance, antifreeze thermostat control, setting & preparation of ice can.
37. Ice plant agitator servicing, maintenance, water filter & evaporator, condenser servicing, preparation of cube ice.
38. Ice removing, storage, ice cuber servicing, maintenance. Place ice method. Reading of lay out drawing of ice plant.
39. Preventive maintenance of ice plants.
40. Ice plant fault finding, servicing & part replacement & testing plant at site.
41. Ice candy plant wiring, testing, preparation of salt solutions like sodium & calcium chloride, glycol solution.
42. Operation, maintenance & testing performance of ice plant, preparation of water. Ice candy water analysis testing.
43. Preparation of milk candy, ice candy, choco bar, preparation of pepsi cola candy, ice candy plant complete installation with pipe lay out. Electric wiring.
44. Use different control instruments for ice candy plant. Repair, maintenance of ice plant and testing at site. Water testing by Ph meter.
45. Introduction to elementary knowledge of a) selection of compressors b) condenser & evaporator c) cooling tower d) expansion valve e) air filters. Selection of insulation thickness.

Note: *Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.*

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.

electrical and apply in day to day work.*[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation &earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing- Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Lettering & Numbering, Freehand sketching of Hand tools used for Wireman / Electrician / Lineman trade & wire joints, Signs & symbols for Electrical components used in electrical circuits and AC/DC systems, Electrical wiring diagram of different lamps, Schematic diagram of plate and pipe earthing, insulators used in over head line, Layout diagram of a substation, Single line Diagram of Electrical substation feeders.]*	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments as per tool list.
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools,	5.1 Explain the concept of productivity and quality tools and apply during execution of job.

and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain 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.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
Block- I & II (Section:10)	
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I & II** (section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*	

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills	Professional Knowledge
1.	Safety: - its importance, classification, personal, general, workshop and job safety. Occupational health and safety. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Importance of housekeeping & good shop floor practices. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Fire& safety: Use of Fire extinguishers. Safety regarding working with different types of steam and its First-Aid.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Institute system including stores procedures. Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE). Response to emergencies e.g.; power failure, fire, and system failure. Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid. Introduction to 5S concept & its application. Fire: - Types, causes and prevention methods. Fire Extinguisher, its types. Define environment, environment Pollution, Pollutants, type of Pollution (Air pollution, water pollution, soil pollution noise pollution, thermal pollution, radiation. Global warming its causes and remedies. Industrial Waste its types, sources and waste Management.
2.	**Basic Fitting :** Marking on flat surfaces as per given drawing by using different marking tools and medias, Punching & hacksawing, Filing surfaces flat & square. Checking for flatness, straightness & squareness. Filing & Fitting of male & female joints within accuracy of + 0.2mm. Using a	Introduction to basic workshop tools & operations like measuring, marking, hacksawing & cutting. Tools used, their identification, use care & maintenance, measurements, marking medias. Introduction to files, their types and uses, care & maintenance, Bench & pipe vice, their uses. Sprit levels & their uses, straight and angular measurements, Bevel

	sprit level and dial test indicator. Measurements by precision instruments. Drilling, reaming & tapping as per given drawings. External thread cutting on pipes.	Protractors. Introduction to precision measuring & least count. Micrometers, Vernier & Height gauges, applications, care & maintenance. Dial gauge vernier & indicator. Drilling, tapping & reaming, types of drills & reamers, different drilling operations, dies & die stocks. Drilling machines, their types & uses, holding devices & fixtures. Types of fasteners, threads. Adhesives & their applications.
3.	**Sheet Metal Work :** Practice in cutting sheet metal to different shapes using various types of snips. Folding/Bending sheet metal to 90^0 using wooden mallet. Practice on hard soldering method (Lead & Tin). Making holes on sheet metal by punching & riveting. Straight & oblique cutting, preparing A.C. ducts & components as per given drawings. Riveting practice, practice on removing dents on spherical & hemi spherical articles.	Introduction to sheet metal work & its applications, materials used for sheet metal work. Hand tools, measuring tools & gauges used in sheet metal work. Different sheet metal operations, their necessity & applications. Sheet metal joining processes, soldering brazing & welding. Sheet metal machinery, shears, forming & folding machines, bending & shearing machines seaming & nibbling machines. Development of surfaces for simple objects like boxes, cylinders, cones, prism & pyramids. Developing & forming A.C. ducts & components.
4.	**Basic Welding :** Setting beading practices, striking & maintaining an arc. Setting up an oxy-acetylene flame. Laying short , straight line & weaved beads on M.S. plates, Fillet welds in open corner, Tee & Lap Joint, fusion runs with & without filler rods. Preparing different joints with gas welding. Soldering & brazing on sheet metal as per braze welding practice. Brazing of different size of copper, steel, aluminum pipes with different brazing material. Use of sliver brazing by oxy-Ace process.	Metal joining processes. Introduction to gas & arc welding. Different hand tools used in welding. Welding accessories like regulators, nozzles cylinders etc. Welding machines & welding transformers, Oxy-Acetylene gas welding plant. Welding processes & positions, welded joints, welding symbols, weld depositions, filler rods & electrodes, their types & selection, care & maintenance. Fluxes, types & application. Distortion in welding, welding defects, their causes & remedial measures. Soldering & brazing, Different types of solder, composition and use of flux- their effect on metal, method of soldering and brazing, Braze welding procedure. Brazing fluxes - their properties, types,

		constituents of fluxes.
5.	**Basic Electricity:** Use of hand tools. Joining practice with single and multi-stand conductors. Joining practice of bare conductors, cable joints. Use of Aluminum flux and Alca 'P' solder. Demonstration and practice of crimping of various wires, Electrical symbols. Use of Multimeters and measurement of current, voltage, resistance in DC/AC circuits. Series circuits - Parallel circuits. Demonstration & Practice on connecting & replacement of common electrical accessories in circuits - Use of tong tester and megger.	Electricity, Safety - in electrical shops & installations. General care & maintenance of common electrical hand tools. Wires & cables -conductors, Insulators & semiconductors, their shapes, sizes with respect to low, medium & high voltage. Crimping equipment -Single & Multistranded conductors joining and soldering. Resistance, Voltage, Current, open circuit and short circuits-Ohm's law - Voltage drop in series & parallel circuits, Electrical measuring Instruments viz., Multimeters, Testers. Common electrical accessories used in Industries, Bus-bars, Relays, Contactors, Circuit Breakers, etc.. Fuses and their ratings, materials used. Earthing & its importance. Preventive maintenance, routine & periodical tests
6.	Simple wiring practice with distribution boards, Junction Boxes, Main Switches two way and intermediate Switches. Identification of different parts of DC generators- testing and measuring the field and Armature resistances. Identification of different parts of AC Motors - Testing and measurement on Induction motors - and generators. Identification and testing of transformers. Grouping & testing of cells for a specified voltage & current - Preparation of battery charging.	Induction principles - Electro-magnetism-Faraday's Laws. Single phase & Poly phase system 3 phase star-delta connections, Impedance & power factor -Principles & Applications of DC Motors, Series, Shunt & compound motor - AC Motors. Transformers their types and applications. Rechargeable batteries - Care & maintenance of cells. AC Motor starting with DOL Starter and Star - Delta Starter. Panel boards & their designing.
7.	Identification and testing of different types of electronic components, symbols. Testing of capacitors, Identification and Testing of assorted diodes, PNP/NPN Transistors - Uni - junction Transistor, Field effect, Transistor & Silicon Controlled Rectifier ICs etc. Soldering & de-soldering practice - Demonstration on Rectifiers - Identification of ICs Full wave & bridge rectifier circuits, voltage	Fundamentals of electron theory - passive components semiconductor devices - Symbols -specifications - Diodes, Transistors, Uni-junction Transistor, Field effect Transistor Silicon Controlled Rectifier & ICs. Half wave, full wave & Bridge rectifier with filters, DC Power supply. Rectification and Rectifiers, zener diode as voltage regulator, Transistor parameters-CB,CC,CE configuration,

	regulators, construction of low voltage power supply, construction of transistor, amplifier circuits. Multivibrator circuits, CR circuits for wave shaping, wiring of SCR, UJT for motor control.	amplification, photo diodes, transistors, multivibrations CR & LR circuits, SCRs, UJTs &ICs.
8.	Testing solid state thermostats, PTCR, remote controls. Operating & testing contactors, relay, pressure controls, timer, solenoid, heater, pressure controls, Identification of keys & display of microprocessor trainer kit.	Thermistor, RTDs, Electronic thermostat, principle of remote control & controllers. Use & specifications of contactors, starter & crankcase heater etc., Introduction to Microprocessors.
9.	Introduction to operations on copper tubing like bending, flaring, swedging, pinching etc. & tools used. Study & sketch refrigerator parts, storing arrangement, Fitting refrigerator doors & hinges, Tube brazing. Safety in handling tools & equipment.	History of refrigeration, its principle & need. Introduction to refrigeration equipment, constructional details of a refrigerator. Heat and temperature. Types of heat and its measurement. Thermometers & thermometric conversions. Atmosphere, air & its constituents. Properties of gases & gas laws. Measurement of pressure. Pressure gauges. Humidity, relative humidity & due point temperature.
10.	Refrigerator cleaning, inspection, testing of components in refrigeration system. Tracing the electrical components and testing relay, OLP, Thermostat, light assembly, door switch etc. To remove & refix refrigerator doors. To cut & fix door gaskets. Refrigerator installation, care & maintenance.	Functions of refrigeration system components i. e. condensers, evaporators and capillary tube. Compressor, its types & working principle. Reciprocating compressors. Comparative study of sealed & open type compressors, Internal construction of a sealed compressor, its part & their functions. Introduction to soldering & brazing, their applications. Brazing Vs welding. Advantages & disadvantages. Brazing Processes. Defects & remedial measures.
11.	Dismantling & assembly of a sealed compressor & value plates, lapping of valve plates & reeds Oil charging of a compressor Recovering CFC / HCFC / HFC by using recovery machines	Compressor lubrication method. Lubricants & their properties. Comparative study of compressors and other component used for R.12, R.134 a & HCs. Refrigerants & their properties Comparative study of refrigerants Ozone depletion & its causes, need for elimination of refrigerant emission through recovery recycling, phasing out of

		CFCs.
12.	Repairing rewiring & servicing of a refrigerator. Leak testing in the system Evacuation & gas charging of a refrigerator. Trouble shooting of electrical & mechanical faults	Methods of leak testing & instruments used. Electronic leak detectors, their types & uses. Defect diagnosis with the help of problem trees
13.	**Revision & Internal Assessment**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

BASIC TRAINING (Block – II)

Duration: (03) Three Months

Week No.	Professional Skills	Professional Knowledge
1.	Tripping the components of frost Free Refrigerator, tracing electrical circuits & defrost, Inspection & testing. Retrofitting of CFC filled refrigerator with Non CFC refrigerant i.e.134a & HC 600. Use of sealed components.	Study of Frost Free Refrigerators, Refrigeration system of Frost Free Refrigerators, components & their functions, electrical components, wiring, automatic defrost & air duct system. Comparative study of refrigerators available in the market. Scope and methodology of retrofitting CFC appliances with HFC & HCS refrigerants, study of refrigerator components using HC refrigerants. Comparative study of performance of refrigerators using different refrigerants.
2.	Dismantling & Assembly of an Air conditioner, study of different components, their functions & specifications. Calculating Relative Humidity by using sling psychometric.	Introduction to Air conditioning, its past, present & future. Air conditioning Fundamentals. Constructional details and functioning of room air conditioner. Air circulation system. Psychometric & psychometric charts, construction & use of sling psychrometer.
3.	Study & testing of thermostatic relay, capacitors, OLP, blower motor. Inspecting & testing condenser & evaporator coil. Checking of electrical wiring by CSR method. PSC circuits in Room A.C.	Study of mechanical & electrical components of Window A. C. & Split A.C., Role of each part. Split A.C., its constructional details, comparison with window air conditioner advantages & Disadvantages. Air cooled condensers: Constructional details & selection.
4.	Dry Servicing & brought down servicing of Air conditioners. Brazing & water immersion testing of evaporator & condenser coils. Evacuating & gas charging of an Air conditioner. Performance Testing for Air Velocity, grill & condenser temperature & smooth running of fan motor.	Air cleaning Filters, their types and specifications. Air flow measurements Use of velocity meters. Performance Testing criterion. Principles of pipe sizing & study of services valves for charging at site. Principle of working of infra red remote control, study of electronic circuits.
5.	Testing all weather air conditioners. Trouble shooting electrical &	Fault diagnosis in window & split A.C. units with the help of problem trees.

	mechanical faults.	
6.	Water cooler construction (Instantaneous and storage) refrigeration circuit, electrical circuit, working and control, soldering of copper tubes with stainless steel, Trouble shooting of commonly faced problem like condenser Fan Failure, corrosion etc.	a) Water storage, distribution and drainage b) Refrigeration system using R-22 and components in lieu of R-12, Retrofitting with HFC-134a & HCs c) Electrical and control system d) Insulation and Energy conservation
7.	Checking- and servicing visi cooler, deep freezer, Preventive maintenance and Trouble Shooting. Retrofitting with Hydrocarbons and HFC 134a.	Chest type bottle coolers, Deep Freezers and visi coolers Description, Construction and function substituting R-12 with R-134a or Hydrocarbon (Montreal protocol) Low temperature thermostat, different type of deep freezer construction.
8.	Ice Candy Plant, refrigeration circuit, electrical circuit, working and control. Cold storage Plant, types of condenser cooling coil used, expansion devices, refrigerant used and electrical circuit study. Drawing out layout of a typical chilling plant.	Ice Candy Plant, Refrigerant used, Brine agitator, Expansion Device; used, Electrical Motor Controls etc. Cold storage plant construction, refrigeration system with condenser & coil type used, RCD device used, super heat concept, electrical devices used. Chilling plants constructional details, System of refrigeration.
9.	Dismantling a pump unit from foundation. Checking the parts, servicing re-installing & testing the unit for performance & power consumption. Identifying parts of pumps & valves & note their functions. Preparing a problem tree for fault diagnosis.	Pumps, types & applications. Centrifugal pumps, their constructional details & applications. Working of a centrifugal pump. Calculations of heads, frictional losses, selection of pump. Valve, their types & applications. Sluice valve, butterfly valve, non return valves, constructional details & principle of working. Fault diagnosis.
10.	Sketching & dimensioning the parts of a typical package unit and study its constructional & operational details. Operating a package unit for its working and performance. Study the installation details & duct system of a package unit. Rewire a package unit. Mechanical, electrical & operational fault finding.	Package Air conditioners, their need, types & applications Ductable & non ductable units. Constructional details of a package unit. Electrical wiring & refrigerant system controls & electrical controls. Installation & operational details. Fault diagnosis with help of a problem tree. Comparative study of package units available in the market.
11.	Installation, servicing & re-installing a car A.C. unit. To test, service & adjust	Automobile air conditioning, need & applications. Difference between a room

	different controls and switches. To check & test the total system for performance. Study of typical central A.C. system using vapour absorption system.	A.C. and automobile A.C. Study the details of a typical automotive air conditioning system parts and their functions. Installation & operation of a Car A.C. Trouble shooting with the help of a problem tree. Vapour Absorption Refrigeration system. Typical refrigeration cycle. Amonia & Lithium Bromide absorption system. Advantages & disadvantages of vapour absorption refrigeration system. Air Refrigeration, steam jet refrigeration & non- conventional refrigeration.
12.	Studying and drawing the layout & piping arrangement of the given Central A.C. Plant. Studying & drawing the chilling water & condensate water circuits. Studying different controls. Maintenance of pumps, compressors & controls. Studying & drawing the panel board connections & wiring. Testing, pumping down & re-testing the plant. Evacuating & gas charging the system. Designing Central A.C. systems for different applications.	Introduction to Central A.C. plants, selection & applications. Direct & Indirect cooling, Air & water as media for cooling. Central A.C. Plant system components, Compressor, condenser & chiller. Fan coiled units & Air handling units. Cooling Towers, their types, constructional details & operation. Cooling Tower installation & maintenance, make up water arrangements. Types of compressors used, loading and unloading arrangements. Ducting & its installation. Different switches & controls. Trouble shooting. Heat load calculations for different site conditions & applications.
13.	**Assessment / Examination (03 days)**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	**Units & Measurements-** FPS, CGS, MKS/SI unit, unit of length, Mass and time. Fundamentals and derived units Conversion of units and applied problems.	Engineering Drawing: Introduction and its importance Different types of standards used in engineering drawing. Drawing Instruments: their uses 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.
2.	**Material Science** : properties -Physical & Mechanical, Types -Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals	Lines : types and applications in Drawing as per BIS SP:46-2003 Drawing geometrical object using all types of lines. **Drawing of Geometrical Figures:** Angle, Triangle, Square, Rectangle and Circle. **Letters: -** Lettering styles, Single stroke letters and numbers as per IS standard. Lettering practice
3.	**Mass .Weight and Density** : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density,	**Dimensioning**- Types of dimension, elements of dimensions, Methods of indicating Values, Arrangement, Alignment and indication of dimensions. **Scales**:-Types use and construction. Representative factor of scale.
4.	**Speed and Velocity:** Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation. Average Velocity, Acceleration & Retardation. Related problems. Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force	Method of presentation of Engineering Drawing - Pictorial View - Orthogonal View - Isometric view

5.	**Ratio & Proportion** : Simple calculation on related problems. **Percentage:** Introduction, Simple calculation.	**Constructions: -** Draw proportionate free hand sketches of plane figures. Sketch horizontal, vertical and inclined line by free hand, Draw circles by free hand using square and radial line method, Draw arcs and ellipse by free hand
6.	**Work, Power and Energy:** work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy. Meaning of H.P., I.H.P., B.H.P., and F.H.P. and CC and Torque.	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. Free hand Drawing of Orthographic projection from isometric/3D view of geometrical blocks

Block – II		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	**Algebra:** Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	**Screw :-** Its Types and Sizes, Screw thread, their standard forms as per BIS, external and internal thread.
2.	**Heat & Temperature:** Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	**Rivets and Joints:-** Prepare a drawing sheet on rivets nomenclature and Joints.
3.	**Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids - cube, cuboid, cylinder and Sphere.	Free hand Sketches for simple pipe line with general fittings.

	Surface area of solids -cube, cuboid, cylinder and Sphere. Volume of cut-out solids: hollow cylinders, frustum of cone, block section. Volume of simple solid blocks.	
4.	**Basic Electricity:** Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections - series, parallel, electric power, Horse power, energy, unit of electrical energy. Concept of earthling.	Reading of drawing. Simple exercises related to missing lines, dimensions. How to make queries.
5.	**Simple machines Transmission of power:** -Transmission of power by belt, pulleys & gear drive. **Heat treatment process: -** Heat treatment and advantages. Annealing, Normalizing, Hardening, Tempering.	Simple exercises related to trade related symbols. Basic electrical and electronic symbols
6.	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables. Finding the value of unknown sides and angles of a triangle by Trigonometrical method. Finding height and distance by trigonometry. Application of trigonometry in shop problems. (viz. taper angle calculation). Calculate the area of triangle by using trigonometry and application of Pythagoras theorem.	Free hand sketch of trade related components / parts /cutting tool indicating angles.
7.	**Concept of pressure** - **Definition**:-Force, Pressure, and their units, atmospheric pressure, gauges used for measuring pressure, problems. Introduction to pneumatics & hydraulics systems.	

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I (Duration – 55 hrs.)	
1. English Literacy Duration : 20 Hrs.	Marks : 09
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	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.
2. I.T. Literacy Duration : 20 Hrs.	Marks : 09
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	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. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks),

	Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. 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. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills Duration : 15 Hrs.	Marks : 07
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
Block – II **Duration – 55 hrs.**	
4. Entrepreneurship Skills Duration : 15 Hrs.	Marks : 06
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to

	the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	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.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity Duration : 10 Hrs. Marks : 05	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education Duration : 15 Hrs. Marks : 06	
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of

	sick person.
Basic Provisions	Idea of basic provision legislation of India. safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in -house environment.
7. Labour Welfare Legislation Duration : 05 Hrs. Marks : 03	
Welfare Acts	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.
8. Quality Tools Duration : 10 Hrs. Marks : 05	
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	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.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

BROAD LEARNING TO BE COVERED IN INDUSTRY FOR MECHANIC (DOMESTIC, COMMERCIAL REFRIGERATION AND AIR CONDITIONING MACHINES) TRADE:

1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)
2. Record keeping and documentation
3. Testing, repairing, assembling, installing different Refrigeration and Air Conditioning machines.
4. Check the performance of different components as per requirement and check functionality.
5. Carryout maintenance of different systems .
6. *Note: Actual training will depend on the existing facilities available in the establishments.*

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

BLOCK – I

1. Servicing of cold-store cooling system. Control and Instrument, Operating of cold storage plant
2. Dismantling of commercial type reciprocating compressor, checking component parts.
3. Checking, servicing valve plate and piston assembling, lapping valve plate etc. Fitting and testing
4. Compressor capacity control lubrication system
5. Servicing of water cooled condenser and discaling of condenser Oil separator Non Return Valve, Vibration eliminator & shock absorber
6. Servicing of cooling tower. Its care and maintenance
7. Servicing of water circulating pump
8. Water piping using G.I. steel pipes, Heard copper tubing
9. Test and adjust of refrigerant control devices and safety devices
10. Servicing of extended surface forced Air-evaporators study of servicing of defrost system
11. Servicing of water brine chillers, brine tank
12. Servicing of sub-liquid Heat Exchangers
13. Servicing of electrical controls in cold storage
14. Electrical wiring of compressor and checking the wiring system of plant
15. Pressure testing leak Test evacuation, Gas charging Ammonia and R-22
16. Cold storage plant operation its care and safety
17. Ice plant, trouble shooting servicing testing
18. Repair and maintenance of Ice-candy Plant leak Test, evacuation and Gas charging

19. Retrofitting Ice-Candy plant with alternate non CFC Refrigerant
20. Pump down of cold storage system and ice plant system
21. Servicing of electric control of ice -plant
22. Routine maintenance, overhauling, preventive maintenance of large. Cold storage and ice plants. Maintenance of log book and record keeping.

BLOCK – II

23. Identification of Refrigeration system & components for cold storage, low temperature systems. Identification of pipe fittings & joints, pipe lay out. Safety, fire-fighting equipments & use.
24. Color coding for pipe, water line pipes, chilled water line pipes Refrigerant gas cylinder & their use. Color code & safety code ISI, Specification. Eco-friendly refrigerant. Retrofitting.
25. Cold storage compressor, condenser servicing & maintenance. Treatment of water.
26. Cooling tower & evaporator coil repairing & maintenance. Adjusting & checking all types of expansion valve for correct function.
27. Stripping & assembling of electric motors & panel board interlock wiring. Heat exchanger & surge drum servicing & repairing.
28. Cold storage room/door assembly & leak testing. Cold storage wiring & instrumentation.
29. Installation of complete plant, erection & pipe lay out etc. Electrical wiring & safety.
30. Cold storage plant, putting the plant into operation, trouble shooting on the erected plant, maintenance & testing of plant.
31. Wiring of cold storage, installation work of cold storage & testing of air leakage.
32. Care & maintenance of cold storage plant. Reading lay out drawing of cold storage plant, their insulation & cooling arrangement.
33. Cold storage overhauling & repair of plant, install, check different type of instruments, controls & electrical wiring.
34. Cold storage repair of compressor and auxiliary equipment at site.
35. Ice plant wiring testing, prepare brine, measure density.
36. Ice plant testing for performance, antifreeze thermostat control, setting & preparation of ice can.
37. Ice plant agitator servicing, maintenance, water filter & evaporator, condenser servicing, preparation of cube ice.
38. Ice removing, storage, ice cuber servicing, maintenance. Place ice method. Reading of lay out drawing of ice plant.
39. Preventive maintenance of ice plants.
40. Ice plant fault finding, servicing & part replacement & testing plant at site.
41. Ice candy plant wiring, testing, preparation of salt solutions like sodium & calcium chloride, glycol solution.

42. Operation, maintenance & testing performance of ice plant, preparation of water. Ice candy water analysis testing.
43. Preparation of milk candy, ice candy, choco bar, preparation of pepsi cola candy, ice candy plant complete installation with pipe lay out. Electric wiring.
44. Use different control instruments for ice candy plant. Repair, maintenance of ice plant and testing at site. Water testing by Ph meter.
45. Introduction to elementary knowledge of a) selection of compressors b) condenser & evaporator c) cooling tower d) expansion valve e) air filters. Selection of insulation thickness.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

MECHANIC (COLD STORAGE, ICE PLANT AND ICE CANDY PLANT)			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Flaring tool set, single type for tube	4.7mm to 16mm O.D.	5 sets
2.	Swaging tool, punch type, set of size for tube	4.7mm to 16mm O.D.	5 sets
3.	Swaging tool, screw type with adaptor set of size for tube	4.7mm to 16mm O.D.	5 sets
4.	Bending spring external type, for copper tube	3mm to 16mm DIA	5 sets
5.	Pipe cutter miniature for copper tube	3mm to 16mm DIA	5 Nos.
6.	Pinch of tool, for copper tube,	6mm to 18mm DIA	5 nos.
7.	Ratchat spanner of reversible	6.4 sq.mm	5 Nos.
8.	Capillary plague gauge		5 set
9.	Pinch of plier/crimping plier tool 6mm -	18mm DIA	5 Nos.
10.	Picreing plier & revercing vlave with access fitting	6-18mm	5 Nos. each
11.	Spanner double ended	4.7mm to 16mm	5 sets
12.	Ring spanner off set	4.7mm to 16mm	5 sets
13.	Wrench adjustable length	150mm	5 nos.
14.	Wrench adjustable length	200mm	5 nos.
15.	Wrench adjustable length	250mm	5 nos.
16.	Valve key handle -	4.7mm & 6.4mm sq.	5 sets
17.	Pressure guage diameter with recalibration set	63mm	5 nos.
18.	Compound gauge, diameter 63mm, with recalibration set screw, scale vacuum 76mm. Pressure 15 Kg/sq.cm		5 nos.
19.	Service man thermometer in metal case -	30 C to +30 C	5 nos.
20.	Scissor, gasket cutting stainless steel, length	25mm	5 nos.
21.	L-Allen key set	1.5mm to 6.4mm	5 sets
22.	T-Allen key set	size 5/32" to 1/8"	5 sets
23.	Screw driver, plastic handle, 6mm TIP length	100mm to 150mm	5 each
24.	Screw driver, plastic handle,	10mm TIP length 200mm to 250mm	5 each

25.	Philips screw driver - complete set in leather case		5 sets
26.	Screw driver, plastic handle 3mm TIP length insulated	100mm to 150mm	5 set
27.	Pliers combination insulated length	200mm	5 nos.
28.	Pliers long nose	200 mm	5 nos.
29.	Pliers flat nose	150mm	5 nos.
30.	Hammer ball pein	220 gms	5 nos.
31.	Hammer nylon	300 gms	5 nos.
32.	Tape measuring 2 m graduation in mm		5 nos.
33.	Chisel flat length	150mm	5 nos.
34.	Hack saw tubular metal frame adjustable		5 nos.
35.	Soldering iron exchangeable copper tip 65 watts		5 nos.
36.	Knife folded stainless steel -	150mm	5 nos.
37.	Line tester 500 v heavy duty		5 nos.
38.	Pipe cutter with built in reamer and space cutter, for copper tube	3mm to 32mm	5 nos.
39.	Spanner double ended	19mm to 31.8 mm	5 sets
40.	Ring spanner off set	19mm to 31.8mm	5 sets
41.	Box spanner	size 6.4mm to 10mm	5 sets
42.	Pipe wrench	size 50mm to 150mm	5 nos. each
43.	Torque wrench square drive right drive right and left hand	300mm 12.7mm	2 set
44.	Socket set, reversible ratchat, 12.7mm square drive with extension	4.7mm to 31.2mm	2 sets
45.	Socket set, reversible ratchat, V2 " mm square drive with extension 3/16'' to VV'' BSW & SR		2 sets
46.	Gas leak detector for halogen gas		2 nos.
47.	Sling phycrometer mounted on aluminium back, scale	50 C to +50 C	5 nos.
48.	Lapping plate	250mm x 200mm	5 nos.
49.	Punch hole for cutting gasket,	4.7mm to 16mm DIA	5 nos.
50.	Hammer ball pein	450 gms	5 nos.
51.	Engineers rule	300mm long	5 nos.
52.	Tape measuring graduation in mm	10m	2 nos.
53.	Oil can pressure type	- 1 litre	2 nos.
54.	File flat medium double cut length	200mm	2 nos.
55.	Scriber	150mm length	5 nos.
56.	Divider spring joint length	150mm	5 nos.
57.	File, half roung medium double cut, length	200mm	5 nos.
58.	Caliper spring joint in side length	150mm	5 nos.

59.	Caliper, odd leg, spring joint length	150mm	5 nos.
60.	Centre punch length	100mm	5 nos.
61.	Pipe being tool, lever type with degree indicator, for tube O.D	6.4mm to 16mm	2 nos.
62.	File, half round, fine double cut, length	150mm	5 nos.
63.	File, round, fine double cut, length	150mm	2 nos.
64.	Puller 3 legged, with flexible arm	120mm	5 nos.
65.	File flat, fine double cut, length	150mm	5 nos.
66.	File square, fine double cut, length	150mm	5 nos.
67.	Snipper sheet metal straight nose	200 mm	5 nos.
68.	Bench vice jaw	75mm	5 nos.
69.	Electrical drill portable drill with chuck and key, capacity	6.4mm	2 nos.
70.	Tong tester 0-10-30 amps 0-500 v (clamp on multimeter)		5 nos.
71.	Blow lamp capacity % liter		2 nos.
72.	Voltmeter, AC/DC portable precision gread teak wood case leather	belt 0 to 500 volt	5 nos.
73.	Ammeter, AC/DC portable precision gread teak wood case leather belt	0 to 5 amp	5 nos.
74.	Blow lamp capacity	1 liter	2 nos.
75.	Ammeter, AC/DC portable precision gread teak wood case leather belt	0 to 30 amp	5 nos.
76.	Megger -	1000v	2 nos.
77.	Puller 3 legged with flexible arm	300mm	1 no.
78.	Hand blower portable complete	1/10 HP	2 nos.
79.	Spirit level precision metallic	200mm	2 nos.
80.	Wattmeter multi-range up to	1 KW	2 nos.
81.	Multimeter digital type		5 nos.
82.	Stop watch		1 set
83.	Tap set with matching drills	3 mm to 16mm	1 set
84.	Tap set with matching drills	VV'' to 5/8''	1 set
85.	Tap & die set	V'' to 5/8'' SAE size	1 set
86.	Refrigerant cylinder	2.5 Kg	4 nos.
87.	Tape and die set	3mm to 16mm size	1 set
88.	Vernier caliper length	250mm	1 no.
89.	Micrometer outside measurement	0 to 25mm	1 no.
90.	Bench vice jaw	120mm	1 no
91.	Heating kit with infra red bulb	(200 w capacity)	
92.	Variac Portable complete with metet & controls	Input 230v output 400v Amp.	1 no.
93.	Multimeter analog type		2 nos.
94.	Work bench	1000m x 600mm x	4 nos.

		800mm High	
95.	Almirahs 195cms x 90cm x 49 cm		2 nos.
96.	Technometer digital, multirange Portable small size in leather case	0 rmp to 3000 rmp.	2 nos.
97.	Micron vacuum gauge capable of reading	upto 20 microns	4 nos.
98.	Transistor tester		5 nos.
99.	R.L.C bridge		5 nos.
100.	Sensor thermometer (digital)		5 nos.
101.	Fin straightener/fin comb.		5 nos.
102.	Filter gauge	0.05 mm - 1 mm	5 nos.
103.	134 A refrigerant in cylinders		2 nos.
104.	Wire gauge metric and whitworth		2 sets
105.	Refrigerant cylinder	30 Kg	2 nos.
106.	Dial thermometer remote control, armoured capillary dial	75mm -50C to +50 C	2 nos.
107.	Anemometer (Vane type)		2 nos.
108.	Trichloroethylene bottle		2 nos.
109.	Scaper triangular blade removable 60mm		2 nos.
110.	Two way manifold with gauges		2 nos.
111.	Pressure testing tank with lighting arrangement, pressure gauge double stage	(0 to 35Kg/sq.m.)	1 no.
112.	Ball valves service valves, hand shut off valves of	VV'' to 7/8''	5 nos.
113.	Fire extinguisher power type		2 nos.
114.	Digital type clamp meter		4 nos.
115.	Four way manifold with gauges		4 nos.
116.	Schrader valve core removal tool		4 nos.
117.	Acid test kit		1 no.
118.	Silver and copper brazing alloy rods for VV" to 7/8" tubes - Cu tocu, cu to steel, cu to brass and appropriate fluxes		5 sets
119.	Pilot tube and inclined tube manometer		2 nos.
120.	Quick couplers, process tube adaptors for	VV" to 3/8"	5 nos.
121.	Compressors testers for small hermetic compressors		2 nos.
122.	Welding table	900mm x 900mm x 700mm high	1 no.
123.	Electrical accessories -: current and potential relays, start & run capacitors, PTCs overload proctectors, relays contactors		5 nos. each
124.	D.B. meter		2 nos.
125.	Recovery unit one each for cfc and 134A refrigerants with recovering cylinders		1 no.

126.	Circulating water pump (small)		1 no.
127.	Safety gloves, eye protection glasses		4 nos.
128.	Safety shoes (optional)		NIL
129.	Pipe threading dies protection glasses		1 no.
130.	Brazing alloy rods for VV'' to 7/8'' tubes -Cu to steel, cu to brass and appropriate fluxes		1 set
131.	Accessories, thermostatic expansion valve, distributors dries (pencil, solid core type etc.) accumulators, receivers, bellows type thermostats, HP stat, LP stat, humidi stat, solenoid valves, OP cutouts		1 no. each
132.	Electrical accessories, DOL starter, single phase preventer		1 no. each
133.	MACHINERY		
134.	Evacuating and refrigerant charging station, compression a) Rotary two stage vacuum pump and motor (with gas ballast and anti such back) manifold with gauges and valves and capable of pulling vacuum upto 50 microns of Hg and with provision of connecting to a microns level vacuum gauge b) Graduated charging cylinder with provision for temperature correction and all necessary isolating valves II) Evacuating and charging station as above but fitted with weighing scale (upto 2 kg. In lieu of (b) above and with accuracy of g for charging hydrocarbons)		1 no 1 no
135.	Two stage rotary vacuum pump capacity approx. 60 - 10rmp capable of evacuating to 50 microns of Hg and fitted with gas ballast, anti such back valve and single phase motor		1 no
136.	Air compressor, two stage for oil - less dry air, with rush proof tank assembly, heater and controls max. pr. 10 kgs/sq.m Capacity 45 ltr. Motor 1 hp.		1 no.
137.	Descaling pumpset with stainless steel impeller and housing complete with motor 1 hp and accessories		1 no.
138.	Reciprocating compressor with provision of capacity control etc. for demonstration. Capacity 9000Kcal/hr. semi hermetic open		1 no.

	type.		
139.	Portable air - LPC brazing kit with 2 kg. LPC cylinder, torches, houses, stand make A) with straight flame B) with eyelone/swirl jet flame		1 no.
140.	Oxy-acetylene welding set complete with cylinders, regulators welding torches with difference nozzles		1 no
141.	Dry N2 in cylinder with 2 stage regular or commercial N 2 in cylinder with drier unit and 2 stage regular		1 no.
142.	Ice candy unit complete with stainless steel tank, mould box, thermocool insulated sunmica body, agitator, compressor, motor ele. Temperature, pressure, refrigerant control gauges, motor, pipe fitting ele 3000 kcal/hr working trainer model/simulator		1 no.
143.	Cold storage plan complete with all controls and accessories including cooling tower and water treatment plant capacity 15000 kcal/hr or working trainer model/simulator		1no.
144.	Condensing unit with open typen compressor air cooled condensor controls ele capacity 3000kcal/hr		1no.
145.	Condensing unit with open typen compressor evaporate condensor controls ele capacity 3000kcal/hr		1 no.
B : INSTRUMENTS & GENERAL SHOP OUTFIT			
146.	Cold storage plant		As required
147.	Ice plant with ice storage		As required
148.	Ice candy plant (General Installation)		As required
149.	Commercial reciprocating compressor with capacity control		As required
150.	Condensing unit		As required
151.	Compressor test-Rig unit		As required
152.	Refrigerant charging station (CFC & NON-CFC)		As required
153.	Air compressor with dry air system		As required
154.	Descalling pump set unit with all accessories		As required
155.	Nitrogen gas cylinder with pressure regulator		As required

156.	Oxy-acetylene welding set		As required
157.	Multistage high vacuum pump with evacuation unit		As required
158.	Air-LPG brazing kit		As required
C. FURNITURE			
159.	Instructor chair and table		1 no.
160.	Dual Desk		8 nos.
161.	Suitable work table with 4 vice		1no.
162.	Suitable work table		1 no.
163.	Stools		17 nos.
164.	Tool cabinet		2 nos.
165.	Trainee's lockers		2 nos.
166.	First Aid Box		1 no.
167.	Book shelf (glass panel)		1 no.
168.	Storage rack		2 nos.

Note: - In case of any tools and equipments repeated in the above tool list only one (1) item to be considered for procurement.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: MECHANIC (COLD STORAGE, ICE PLANT AND ICE CANDY PLANT)

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid	45^o (250 X 1.5 mm)	20+1 set
3.	Set square celluloid	30^o-60^o (250 X 1.5 mm)	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board	(700mm x500 mm) IS: 1444	20+1 set
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board		20
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board	(size: 8ft. x 4ft.)	01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														