

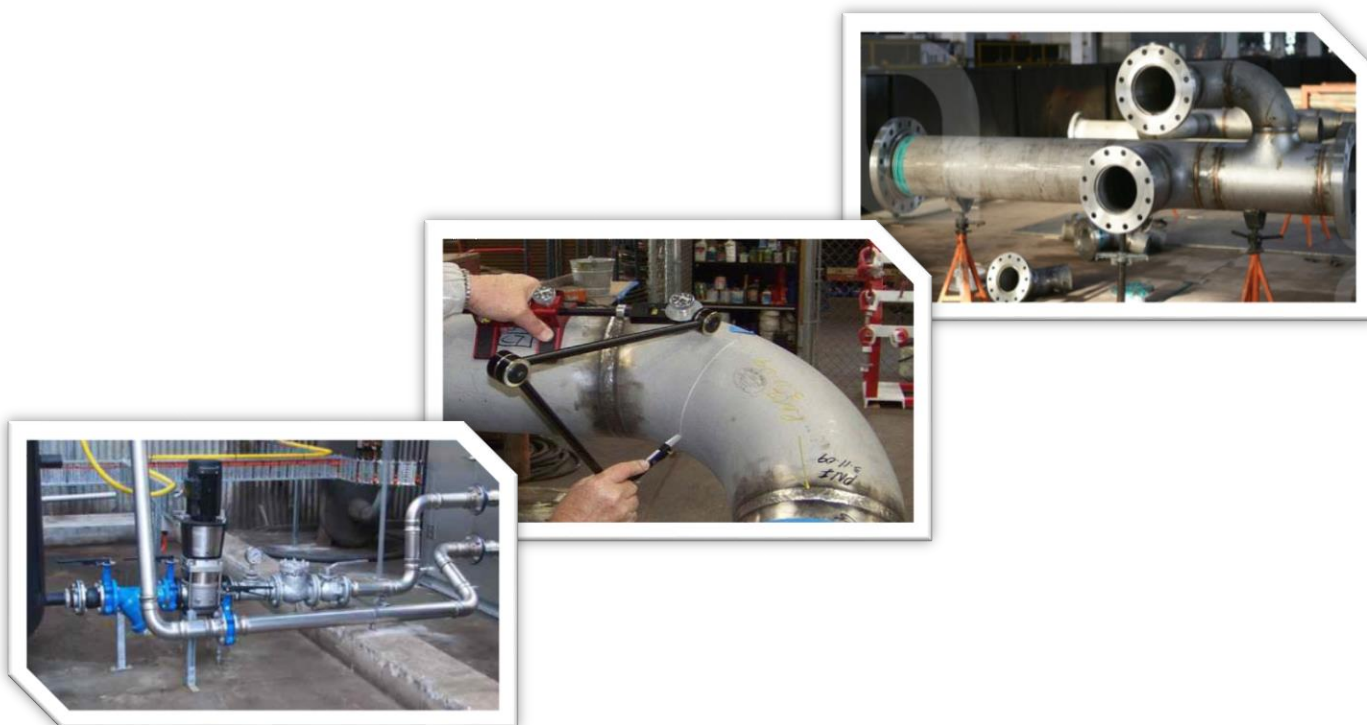
PIPE FITTER

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



SECTOR – MARINE



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

PIPE FITTER

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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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.

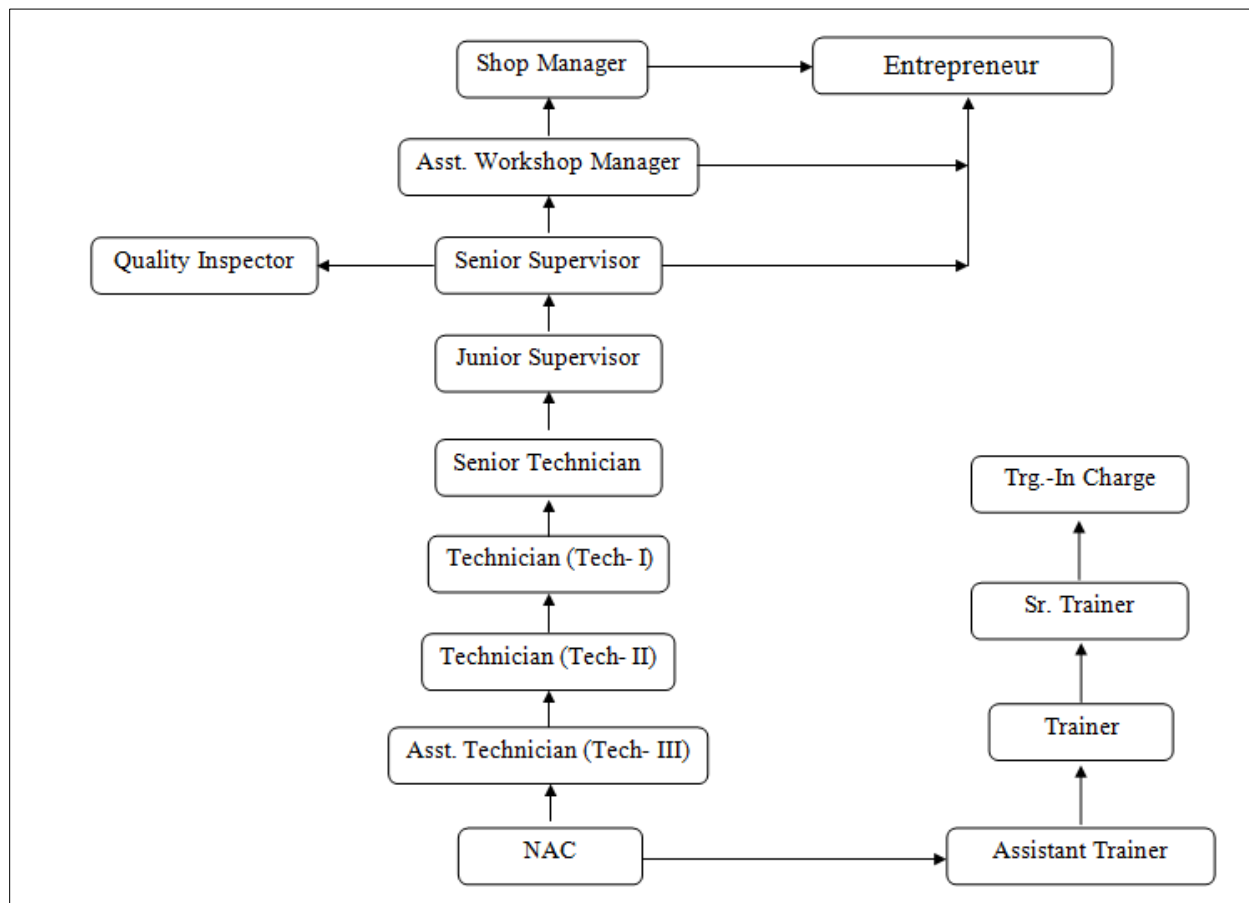
Pipe Fitter trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while 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%.

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	• Demonstration of good skill in the use of hand tools, machine tools and workshop

showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	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:

Pipe Fitter lays repairs and maintains, pipes for supply of water, gas, oil or steam in buildings, gardens, workshops, stores, ships etc., according to drawings or instructions. Examines drawings and other specifications or receives relevant instructions. Cuts passage holes for laying pipes in walls and floors. Cuts reams, threads and bends pipes according to specifications. Lays pipes in cut passage and assembles pipe sections with couplings, sockets, Tee's elbows etc. Levels position of pipes using spirit level for gravitational flow. Caulks joints, tests them for leakage with pneumatic or hydraulic pressure and secures pipe line to structure with clamps, brackets, and hangers. Fits water meters, taps etc to pipe where necessary. Repairs and replaces leaky pipe lines, taps and joints and provides connections to overhead water tanks. Helps Plumber General in fittings sanitary fittings to buildings. May join pipe sections and fittings.

Plumber, General lays out, assembles, installs and maintains sanitary fittings and fixtures, sewage and drainage systems, heating and sanitary systems, gas and water pipe lines etc. Receives instructions from Sanitary Engineer or Civil Engineer regarding layout of pipes, gas or water mains, position of fixtures and fittings, etc. Examines drawings or other specifications regarding size and dimensions of area where sanitary fittings or pipe are to be fitted or laid. Marks points at places to indicate position for fixing brackets and laying pipes. Drills passage holes in walls or floor of premises and fixes necessary brackets, stands, holders etc. to keep or hold fittings and fixtures in position, using nuts, bolts, clamps etc. and tightens them with hand tools. Cuts reams, threads and bends pipes as appropriate. Ensures that pipe lines are laid properly by Pipe Fitter. Joins pipes with sockets, Tees, elbow etc. or with molten lead or lead wool. Caulks joints (operation of making joint seam tight to withstand pressure) and tests them for leaks with pneumatic or hydraulic pressure. May repair and maintain sewerage and pipe lines by replacing washers on leaky faucets, mending burst pipes, opening clogged drains, etc. May do lead burning, dressing and bossing of lead pipe and sheet lead, inlaying of wooden tanks, construction of septic tanks etc

Reference NCO: 7126.0301, 7126.0101

4. NSQF LEVEL COMPLIANCE

NSQF level for Pipe Fitter 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 Pipe Fitter 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	PIPE FITTER
NCO-2015	7126.0301, 7126.010
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 10 th Class with Science and Mathematics 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 trades 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 Pipe Fitter Apprenticeship	Plumber

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 Pipe Fitter 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 construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
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. Instruction to safety precaution on the shop floor. Chipping, filing, grinding , of chisel, drilling, threading with taps and dies, soldering , brazing , welding (gas and arc).
2. Cutting of sheet metal of size.
3. Making for excavation cement joining of pipes.
4. Pipe bending, hot bending and cold bending process.
5. Pipe fabrication system, following simple sketches taken on ships and other shore ablation.
6. Method of jointing of different metal pipes (ferrous and non ferrous metal) flanging, screwing, butt welding, wiping, brazing, lead burning, cementing etc.
7. Fabrication of accommodation pipe fitting, liquid seal, scupper box, refrigeration scupper box, gulley scupper box, wash basin brackets rose boxes.

8. Dismantling and repairing, cleaning, painting of pipe lines as per IS codes.
9. Pump connections layout of piping system bilge, ballast, fire service (liquid and gas) sea water cooling, fresh water cooling, sea water, fresh water, hot water drainage, feed lines.
10. System and exhaust piping, boiler feed water supply boiler exhaust gas lines, main engine exhaust gas lines, and auxiliary generator exhaust gas lines.
11. Layout of heating coil system and principles of pipe lay out, clamping, ranger and support, testing etc.
12. Insulation of piping system /lagging of pipe.

Block – II

13. Soldering and brazing ferrous and non ferrous metals.
14. Cutting and preparation joints. PVC fitting, layout of PVC Pipes.
15. Laying out pipes-alignment and jointing hummed and wrought iron / PVC Pipes of different sizes.
16. Layout water supply systems of a small town , use types of pumps , suction pumps, suction force pumps, plumber force pump, centrifugal pump etc.
17. Prepare template and use.
18. Use cock and valves of different types.
19. Erection of rain water and drainage pipe system-installation of sanitary fittings inspection and testing of water supply system pipe alignment and slope.
20. Bending of lead pipes –precaution.
21. Domestic drainage system –general layout. one pipe system . specification of material required method of testing leakage.
22. Layout for domestic hot and cold water, estimate materials required and connect pipe to mains. Tracking leakage and repair.
23. Prevention of corrosion, corrosion due to electrolytic action.
24. Exhaustive training on ship welding piping.

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 electrical	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.
	2.2 Measure dimensions as per drawing

and apply in day to day work. <i>[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]</i>	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. <i>[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]</i>	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 such as micrometers, vernier calipers, dial gauge, bevel protector and height gauge (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	5.1	Explain the concept of productivity and quality tools and apply during execution of job.

tools, 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	
<u>Block-I & II (Section:10)</u>	
<i>Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under block – I & block – 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.</i>	

BASIC TRAINING (Block – I)**Duration: (03) Three Months**

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Familiarization with the institute. Importance of trade training. - Machinery used in the type of work done by trainees in the institute. Type of jobs made by the trainees in the trade. Introduction to safety: Equipment including fire fighting and their uses.	Importance of safety and general precautions required for the trade. Importance of the trade. Types of work to be done by trainees in the institute. Scope of a plumbing work. Types of services have to plan. Basic Bench fitting
2-3	Use of steel rules, engineers square, Scriber and dividers for marking out from drawing. Technique of handling & use properly the various Fitter's hand tools: hacksaw, centre punch, chisels, hammer, calipers, different files, bench vice and hand vice, taps ,dies and holders.	Fitter's common hand tools - names, description and material from which they are made. Description, types and uses of :holding device , hammers & cold chisels, cutting tools
4	Making for drilling holes Drilling, tapping and threading on pipes. Use of various locking devices, Fastening devices Demonstration and uses of Carpenter's hand tools involving sawing, planning, chiseling and making simple joints.	Description of simple drilling machine. Method of using drills, taps and dies. Description of simple bench drilling Machine. Description and uses of Carpenter's hand tools used for simple operations such as marking, sawing, planning and making simple joints.
5	Threading pipe of various sizes. Fixing of different fittings. Practice of gas welding: Joining of pipes of different diameters and thickness by welding.	Different types of pipes- GI, CI, PVC / CPVC, PPR, AC and HDPE etc. Gas welding : Gas purpose, Method of gas welding, Safety precautions to be observed Methods of soldering
6	Use of mason hand tools : Straight edge spirit level, plumb bob, square, etc Setting out work with tape, rule, square, line pin, and level. Cutting bricks and stones to given size and template.	Masons hand tools: Names, description and their uses. Method of making holes in walls and floors. Types of tools used and various Processes.
7-8	Preparation of cement mortars in different, Elementary brick work such as	Concept of bricks and cement. Common brick joints. Concept of Scaffolding.

	construction of gulley trap, inspection chamber & manhole of any convenient size. Cutting of wall with Masonry electric / power cutting tools.	Method of construction of manhole etc.
9-10	Use and care of the plumber's tools and equipments. Cutting of pipes of different metals of different dimensions and sizes. Bending of mild steel pipes and tubes and PVC pipes Bending method: Practice on cutting pipe at different angles for different joints. Steps of simple pipe connection Bending, cutting of pipes as per drawing, Measurement of bent pipes.	Identify plumbing services required for each type of building according to usage. Description of plumber tools and Equipments-ratchet, brace, threading die, pipe wrench, sliding wrench, spanner set, chain Wrench etc. and their safety. Plumbing Symbols. Care & use of tools. Pipes - different kinds. Pipe fitting – bends, elbows, sockets, tees, unions etc. their description, specification and use. Water hammer in pipes.
11	Tacking pipes as per drawing. Checking tacked pipes Pipe welding in 1G and 2G position - butt joint, elbow joint, T-joint, angular joint, flange joint, etc. TIG and MIG welding Inspection and clearance using LPI testing during Root pass and cover pass Checking pipes after welding	Various types of pipe joints, pipe welding positions, and procedure. Difference between pipe welding and plate welding. Pipe welding position 1G, 2G, 5G & 6G
12	PVC welding PPR pipe welding joint Layout of P.V.C. pipe according to drawing. P.V.C. Description, Properties & use in plumbing work. Method of cutting & preparing joints. P.V.C. fittings their description & use. Method of laying out PVC pipe. Fixing of pipe accessories	Equipments and tools for hot gas welding and electric hot plate for PPR pipe joints Impurities of water – organic and inorganic impurities Sources of water Different kinds of joints in joining pipes- GI,PVC/CPVC and HDPE etc.
13	Revision 02 days Internal Assessment 03days	

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 (Trade Practical)	Professional Knowledge (Trade Theory)
1	Laying out of hummed and wrought iron / PVC pipes according to drawing alignment of pipes and joining them. Repair of leaks. (The pipe of minimum dia. should be used).	Use of hummed and asbestos pipes of different sizes. Method of laying out pipes alignment and joining.
2	Fabricate steel / metal pipes as per drawing – knowledge on part list in identifying, picking up and collecting correct items. Joining of pipes with different materials and diameters with various fittings. Cupro nickel / aluminium brass pipes and joints	Description of various pipe joints- straight, Branch, Taft and blow, Expansion joints. Solders and fluxes used in joints.
3	Construction of inspection chamber, manholes, gullies traps. Testing of drainage lines smoke test, water test, smell test, ball test, mirror test, etc.	Inspection chamber, septic tank, description of drains, cess pools, soak pits etc. Types of traps layout of drainage system Method of bending pipes by hot and cold process.
4	Tracing out leakages and repairing of water supply system. Removal of air locks. Rain water harvesting system	Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing. Installation of water meters. Air lock in pipes and its removal.
5	Erecting simple water supply system including Installation of water meter. Branching of pipes. Fixing, testing & repair of Bath tub wash. Basin etc. Erecting rain water and drainage piping system. Installation of sanitary fittings like water closets, urinals	Erecting rain water and drainage pipe system, installation of sanitary fitting s, inspection and testing of water supply system. -Pipe alignment and slope. -Prevention of water hammer. Storage tanks for general water supply propose. Test for water supply pipes. Description of sanitary fittings, general points to be observed when choosing sanitary fittings.
6-7	Fixing of C.I. external water pipe with branch to receive lead waste pipe from bath & wash basin and another branch – lead waste pipe from sink.	Domestic drainage system: General layout, one pipe system, Specifications of materials required.

	Fixing of external soil pipe with sand branch fitted to take lead soil pipe from W.C. Fixing of rain water gutter, outlet and Ground pipe. Preparation and fixing of lead sink waste. Measurement, preparation and fixing up of lead wastes from wash basin and bath.	Method of testing leakage. -Different types of traps, ventilation, anti syphonage and sinks.
8	Measurement, cutting, preparation and fixing up of rising mains and Distributing pipes as per layout. Preparation and fixing of hot and cold services to the bath and wash basin as per layout. Installation of hot water system. Erection of Geysers. Description of solar water heating system.	Domestic hot and cold water. General layout, specification of materials required and Connection of pipes to mains. Tracing leakage. Repairs to service main. Domestic boilers and Geysers. Method of ventilating pipe. Precaution against air Poisoning. Fixing of solar water system.
9	Cleaning of sanitary installations including pipes. Reconditioning and testing of taps, valves, overhead tanks, Flushing cisterns, etc. Scraping and painting of pipes. Repairing of broken or cracked sanitary fittings.	Sensor system for urinals and was basin, etc. Corrosion - causes and remedies, revention. Corrosion due to electrolytic action. Cathodic / Anodic protection. The effect of water and frost on materials. Layout of pipes as per drawing.
10-12	1. Testing plumbing installations.	
13	Internal Assessment/Examination 03days	

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.	Common fraction addition, subtraction, multiplication and division, application of fractions to shop problems CGS and FPS system of units of length, weight, their conversion	Use of drawing instruments, T-square & Drg. Board. Free hand sketching of straight line rectangles squares, circles, polygons etc. – 2 Hrs.
2.	Uses of cast iron, wrought iron, plain carbon steel and alloy steel. (Brief coverage)	Free hand sketching of solid bodies with dimension to scale and proportionate sketching. – 2 Hrs.
3.	Applied workshop problems , Uses of copper zinc lead, tin, aluminium, brass, bronze, solder, bearing metals, timber. Asbestos, plastic materials, ceramic, asphalt. Conversion of decimals of common fraction. Applies problems.	Simple orthographic projection first angle. Simple orthographic projection third angle. (To have a general concept of objects & figures which are covered above) - 4Hrs.
4.	Square root of a perfect square root of a whole number and a decimal,	Simple isometric drawings. Isometric views of simple objects such as squares, rectangles, cubes, rectangular blocks etc. - 4Hrs.
5.	- The weight of a body, unit of weight shop problems. - Average and Percentage - its application –shop problems.	Conversion of orthographic views of solid objects like cubes, parallelopoids, prisms, cones, cylinders, etc. Into isometric views. (Single line isometric drawing and double line isometric drawing reading with symbols to understand symbolic figures of pipe fittings and accessories. Reading the rotations in isometric is to be taught.) - 12 hours
6.	Ratio and proportion, applied problems.	Construction of simple figures and solids such as cubes rectangular block cylinders etc - 2Hrs.
7.	Mensuration - areas of rectangle, square triangle.	Lettering number & alphabets. - 2Hrs.
8.	Mensuration - areas of circle, regular polygons etc	Free hand isometric sketching of simple objects with dimensions including piping isometrics 2Hrs

Block – II		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration : - 30 hrs.)
1.	Calculation of area, calculation of volume and weight of solid bodies such as cubes, squares and hollow bodies, shop problems.	Views of simple solid and hollow bodies cut by section plane.
2.	Heat and temperature - Fahrenheit and centigrade scales and their conversion. Name and use of temperature measuring instruments used in workshops.	Symbols of Valves and Fittings Symbols of colour schemes for piping systems
3.	Geometric properties of angles, triangles and circles. Trapezoid, etc. - Simple problems	Layout plan of a small village or town and mark the water line with valves of all types & the position of the reservoir. piping & installation (P&ID) diagrams / drawings details.
4.	Calculation of volume and weight of pipes of different dia and thickness Determination of pipe length.	Study of building plan & mark the position of the water supply line, drainage line connection to sewage line
5.	Electricity and its uses, electric current positive and negative terminals. Use of switches and fuses, conductor & insulators. Reading of simple graphs.	General arrangements of piping in various sections of ship hull and machinery piping layout, such as Double bottom tanks, various desks, Accommodation, refrigeration and cooling system
6.	Trigonometry – sine, cosine and tangent – simple problems.	Sketches of Deck and bulkhead fittings.
7.	Pressure testing methods in use and description of each necessary for expelling air in hydraulic testing, atmospheric pressure, etc. Danger due to creation of vacuums.	- Blue print reading: identify the size, material, pressure machinery valves and fittings, direction of flow, and to estimate the quantity of materials required, etc. - Hydraulic piping and system.
8.		Freehand isometric sketching plan of simple objects like hexagonal bar, square bar , circular bar , piping isometrics

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	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),	

Internet	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 Turner Trade:

1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)
2. Record keeping and documentation
3. Making components observing different metal removing procedure and perform different fitting job.
4. Assembling of different components as per requirement and check functionality.
5. Carryout maintenance of different machines including hydraulics & pneumatics system.

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. Instruction to safety precautions on the shop floor. Chipping, Filing, Grinding of chisels, Drilling, Threading with Taps and dies, Soldering, brazing, Welding (Gas and Arc)
2. Cutting of sheet metal of size. Preparation of sheet metal articles involving development. Forming of rolls, welts corners & slashing in sheet. Measurements wire gauge and sheet gauge. Preparing gasket,
3. Marking for excavation. Cement joining of pipes. Pipe fitting practice using standard G. I. pipe fittings, Copper pipe work: branch opening, diameter reduction / expansion / development of pipe.
4. Pipe bending, hot bending and cold bending process.
5. **Pipe fabrication system:**
 - a) Following simple sketches taken on ships and other shore ablation.
 - b) Pre-fabrication of pipe lines on shop Floor from detailed diagrams and working drawing (supplied)
6. Method of jointing of different metal pipes (ferrous and non-ferrous metal) - flanging, screwing, butt-welding, wiping, brazing, lead burring, cementing, etc.
7. Fabrication of accommodation pipe fittings: liquid seal, scupper box, refrigeration scupper box, gulley scupper box, wash basin brackets, air pipe hoods strainer (filters) mud boxes, rose boxes
8. Dismantling and repairing, cleaning, painting of pipe lines as per I S colour codes. Erection of various piping system on board, special care regarding control valves like glove valves, gate valve (SDNR), Screw down non-return valve, check valves quick closing valves, Safety Valves, spring loaded safety valves, lever system (Relief valve).
9. Pump connections layout of piping system-bilge, ballast, fire service (liquid and gas) sea water cooling, fresh water cooling, hydro hour lines, sea water, fresh water, hot water circulation, drainage, feed lines.

10. System and exhaust piping, boiler feed water supply boiler exhaust gas lines, main engine exhaust gas lines, auxiliary generator exhaust gas lines.
11. Layout of heating coils system and principle of pipe lay- out, clamping, Ranger & Support, testing, etc. Pipe routing, preparing drawing from true layout on board, study the structural drawing, coordinating other fittings on board and finalizing the other piping system. Making simple sketches.
12. Insulation of piping systems / lagging of pipe. Expansion joints in steel pipe and its applications. Testing of all piping systems before and after installation.
13. Composition of water--hard & soft water- temporary hardness and permanent action of water on lead-water softness-test for water-static hardness. Water on pressures and measurement of pressure - bursting pressure – expansion of water on freezing and heating. Pascal's Law. Pressure of water on the sides of cistern or tank, water hammer in pipes.

Block – II

14. Soldering and brazing-ferrous and non-ferrous metals. Different joints for different pipes. Use types of fluxes. Precautions to be taken while fixing. Fitting of different joints for different pipes, water fittings
15. Layout of drains, manholes, cess-pools and septic tank- drainage system, types of traps. Cutting and preparing joints. PVC fittings, laying of PVC pipes.
16. Laying out pipes-alignment and jointing: hummed and wrought iron / PVC pipes of different sizes. (various joints - straight joints, branch joints, Taft and blown joints, expansion joints in lead pipes and block flange joints. Solders and fluxes used in joints.
17. Layout Water supply systems of a small town. use Types of pumps - Suction pump, suction and force pump, plumber force pump, centrifugal pumps etc. use of pipe dies - their, care and precaution. Bending. Jointing and fixing pipe. Jointing material for water and gas pipes. Use of blow lamp.
18. Prepare template and use. Use Bending machine - bend pipes in hot condition or cold condition.
19. Use cocks and valves of different types. Repairing of the valve and pipe line - dismantling and reconditioning. Repair leaks in pipes, noises in plumbing, setting of meters, Air lock in pipes and its removal.
20. Erection of rain water and drainage- pipe system-installation of sanitary fittings- inspection and testing of water supply system pipe alignment and slope, Prevention of water hammer Storage tanks for general water supply purposes. Tests for water supply pipes.
21. Bending of lead pipes - Precaution. Bending of galvanized and other heavy pipes, their methods.

22. Domestic drainage system –general layout. One pipe – system. Specification of materials required. Method of testing leakage. Different types of traps W. C. and sinks. Ventilation and anti syphonage.
23. Layout for Domestic hot and cold water, estimate materials required and connect pipes to mains. Tracking leakage and repair. Fitting domestic boiler and Geysers, Methods of ventilating pipes. Precautions against air poisoning.
24. Prevention of corrosion, corrosion due to electrolytic action. Cathodic / Anodic protection.
25. Exhaustive training on ship welding piping
 - a) Fabrication of Steel / Metal pipes
 - b) Reading isometric drawings
 - c) Knowledge on part list reading & identifying & picking up / collecting right items.
 - d) Bending cutting, grinding, measurement of bent pipes, tacking of pipes as per drawing.
 - e) Checking of tacked pipes.
 - f) Checking the pipes after the welding.

Note:

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

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

PIPE FITTER			
LIST OF TOOLS & EQUIPMENTS FOR THE BATCH OF 20 APPRENTICES			
Sl. No.	Name of the items	Specification	Quantity (indicative)
A. TRAINEES TOOL KIT:			
1.	Rule Steel	300 mm both in inch and mm	21 Nos.
2.	Rule Wooden 4 fold,	600 mm	21 Nos.
3.	Hacksaw Frame adjustable	for 250 to 300 mm	21 Nos.
4.	Scriber	200 mm	21 Nos.
5.	Centre punch	100 mm	21 Nos.
6.	Chisel Cold, flat	20 mm	21 Nos.
7.	Hammer ball pein	800 grams	21 Nos.
8.	Hammer ball pein	50 grams	21 Nos.
9.	File flat rough	300 mm	21 Nos.
10.	Level spirit wooden	300 mm	21 Nos.
11.	Plumb bob	50 grams	21 Nos.
12.	Trowel C-125-I S: 6013		21 Nos.
13.	Stillson wrench	200 & 350 mm	21 Nos.
14.	Screw Driver	250 mm	21 Nos.
15.	Wooden Mallet small I S: 2022		21 Nos.
16.	Cutting pliers 200mm I S : 3650		21 Nos.
17.	Steel tape	5m	21 Nos.
B. TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS:			
18.	Marking Table	900X600X900mm high	1 no.
19.	'V' Blocks with-63AIS2949 clamps 80/7		1no.
20.	Combination set	200 mm	2 nos.

Pipe Fitter

21.	Scribing Block, Universal,	300 mm	1 no.
22.	Hand Vice, Jaw	50 mm	2 nos.
23.	File Flat, Smooth	200 mm	2 nos.
24.	File Half Round, Rough	300 mm	2 nos.
25.	File, Square, rough	250 mm	2 nos.
26.	File, Square, Smooth	200 mm	2 nos.
27.	File Triangular Rough	250 mm	2 nos.
28.	File Flat Rasp	250 mm	2 nos.
29.	File Triangular Smooth	200 mm	2 nos.
30.	Chisel Cold Flat	20 mm X 300mm	2 nos.
31.	Chisel Cross Cut	6X150 mm I S-402	2 nos.
32.	Chisel Round Nose	3X150 mm I S -402	2 nos.
33.	Chisel Diamond Point	6X150mm	2 nos.
34.	Tap and Die set to cut B.S.F. , B.S.W.		1 set each
35.	metric threads of sizes M-6 to M-12		1 set each
36.	Screw Pitch gauge to cover above threads		1 set
37.	Punch , Letter set		1 no.
38.	Punch , Number set		1no.
39.	Saw Plumber	300mm	2 nos.
40.	Spanner monkey up to	50mm	2 nos.
41.	Stove melting solder		1 no.
42.	Cutter ,Pipe, wheel type	6mm to 25mm	1no.
43.	Oil stone	150X50X25mm	2 nos.
44.	Soldering Iron , Copper , Bit , Fire heated , Hatched , Straight	500 grams	4 nos.
45.	Snip Straight	250mm	2 nos.
46.	Snip bend	250mm	2 nos.
47.	Try square	200mm	2 nos.
48.	Inside Caliper	150mm	2 nos.
49.	Caliper outside	150mm	2 nos.
50.	Odd leg caliper	200mm	2 nos.
51.	Tenon saw		2 nos.
52.	Hand Saw.		2 nos.
53.	Mortise Chisel		2 sets.
54.	Firmer Chisel		2 sets.
55.	Mallet Medium IS: 2922		2 nos.
56.	Jack plane		2 nos.
57.	Gas Welding set with oxygen acetylene cylinder		1 no
58.	Goggles pair welder	100 mm	2 pairs
59.	Brush Steel Wire	150X 50 mm	1 no
60.	Table welding	1200X 750 mm with fire	1 no.

Pipe Fitter

		bricks top and stand	
61.	Pliers combination	200 mm	2 nos.
62.	Blow lamp	500 milliliter	2 nos.
63.	Washer cutter		1 no.
64.	Mirror	100X150 mm	2 nos.
65.	Scribing gauge		1 no.
66.	Soil pot with brush		1 no.
67.	Pot- Hook		1no.
68.	D. E. Spanners	7X8, 10X11, 13X1. 7, 19X2.2, 24X27 IS:2028	2 sets.
69.	Branch Gimlets		2 nos.
70.	Bending Spring		1 set.
71.	Plumbers Ladle		2 nos.
72.	Tool caulking set of 5		2 nos.
73.	Plumbers' metal melting pot	10 kg	1 no.
74.	Pipe stock and dies complete with stocks, bushing , bushing holders, Taps and wrenches sizes covered, to suit pipes of bore dia	6,8,10,20,25,32,40,&50mm	4 sets
75.	Pipe vice to grip up to 77 mm is -2587		8 nos.
76.	Stillson pattern pipe wrenches	450 mm to take pipe up to 52 mm dia I s -4003	2 sets.
77.	Stillson pattern pipe wrenches	300mm to take pipe 20 mm to 32mm	2 sets.
78.	Chain :pipe wrench	90mm -650 is 4123	2 sets.
79.	Adjustable, spanner	A-375, IS- 6149	2 nos.
80.	Anvil	50 or 63 kg. IS- 510	1 no.
81.	Pipe bender, manually operated		1 no.
82.	Leg vice,	75mm jaw on Stand IS -2588	1 no.
83.	Hand drill 6mm capacity with drill chuck (Electric)		1 no.
84.	Drill Twist (straight shank) 3mm to 6mm		1 set.
85.	Portable forge	450mmwith hand blower	1 no.
86.	Flat smithy tong		2 nos.
87.	working bench	2400x1200x750mm with 4 voice 125 mm jaws	2 nos.
88.	Bath tub small size		1 no.
89.	Wash Basin (16"X14"X10")Equivalent		2 nos.
90.	Water Heater 10 liter		1 no.
91.	Water closet (European type p) complete with over head cistern		1 set.
92.	Water closet (Indian type) complete		1 set.

Pipe Fitter

	with over head cistern		
93.	Urinal wall type complete with automatic system		1 set.
94.	Water meter		2 nos.
95.	Fire Extinguisher		1 no.
96.	Fire Buckets with stand		1 no.
97.	Sight rail and boning rod		1 no.
98.	Ratchet pipe die 15 mm to 32 mm		1 no.
99.	Double face hammers		2 nos.
100.	Dormat, Pickaxe, Spade, Girmale		1 each
101.	Solar water heater system		1 no.
102.	Ring gauge 15 mm,20mm,25mm,32mm		1 each
C. GENERAL MACHINERY INSTALLATIONS:			
103.	Hammering drilling machine		1 no.
104.	Electric PPR pipe welding machine		1 no.
105.	Electric pump	1 HP	1 no.
106.	D.E. pedestal grinder with two wheels 175mm rough and smooth		1 no.
107.	Hydraulic pressure machine for testing leakage in GI pipe fittings etc.		1 no.
108.	Bench drilling machine with chuck and key upto	15mm capacity	1 no.
109.	Pipe bender(Hydraulic type)		1 no.

Note:

- In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING
DRAWING**

TRADE: PIPE FITTER

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° (250 X 1.5 mm)		20+1 set
3.	Set square celluloid 30°-60° (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.
<i>Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.</i>		

Skill India
कौशल भारत - कुशल भारत

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	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total internal assessment Marks	Result (Y/N)
	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		
1														
2														