

FITTER STRUCTURAL

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



Skill India
कौशल भारत - कुशल भारत

SECTOR – CONSTRUCTION



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

FITTER STRUCTURAL

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)



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Developed By

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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.



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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.

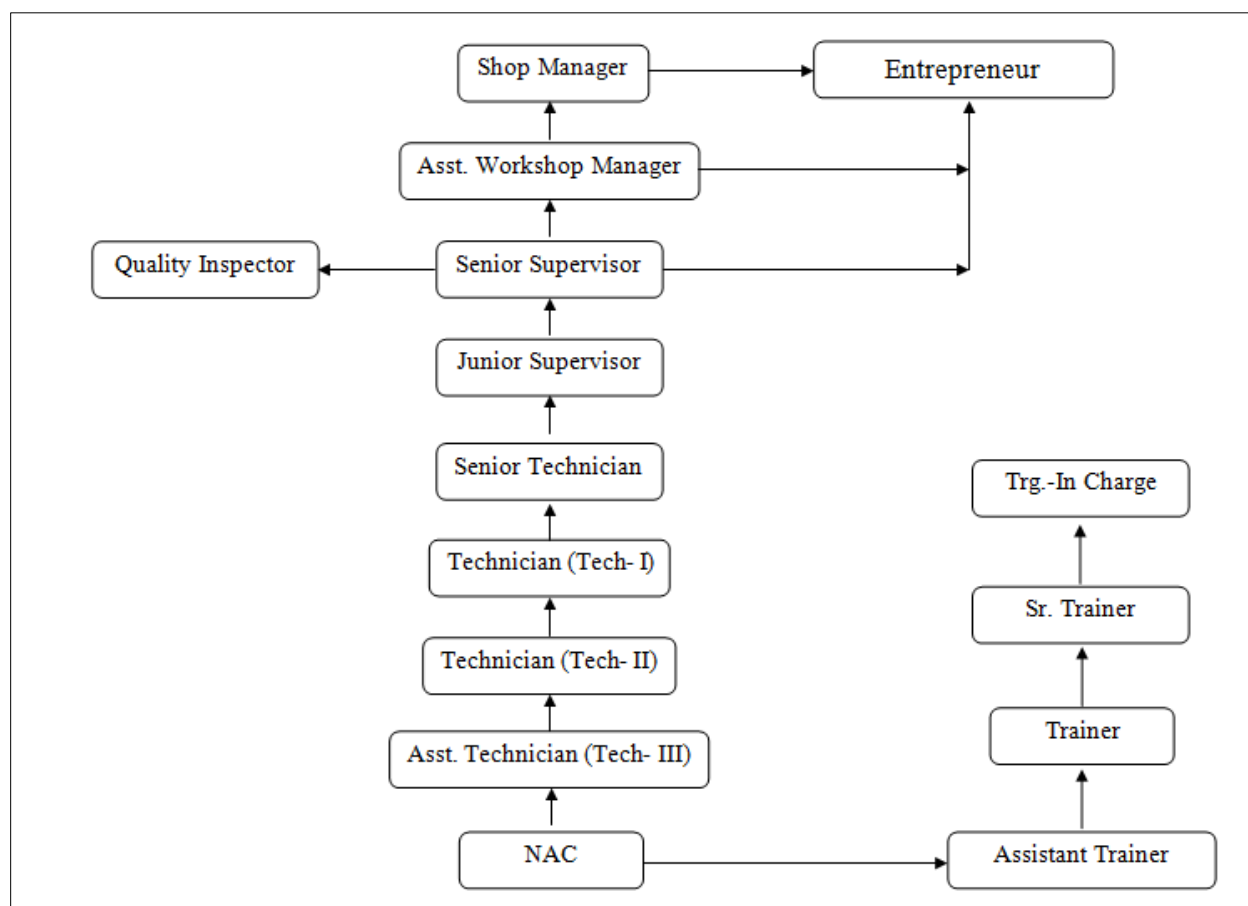
Fitter Structural trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge,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

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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. 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 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 above 75% - 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.

Brief description of Job roles:

Fitter General sizes metal parts to close tolerances and fits and assembles them using hand tools for production or repairs of machines, or other metal products. Studies drawings to understand specification of different parts, fittings or assembles to be made and their functions. They select materials, appropriate tool and equipments to carry out their work. Holds the work in Vice, Cuts and shapes required parts to dimensions and specifications by processes of sawing, chipping, filing, grinding, drilling holes, screw cutting, scrapping etc., using hand tools for making specimens or finished components. Measures object while working using foot rules, calipers, micrometer, gauges etc. and checks for correct filing with square. Gets half-finished object marked or marks it himself using face plate, marking block scribe, vernier, height gauges, vee-blocks, angle plate, sine plate, slip gauges, combination set, etc. depending on accuracies required, to indicate guide lines for finished sizes, holes to be drilled and pitch centres, threads to be cut and other working details as specified in drawing or sample. Clamps object securely in correct position in vice and files it to required dimensions according to punch marks and guide lines frequently measuring it with calipers, micrometer, vernier, gauges etc, makes holes with drill, cuts threads with taps and dies ensuring that they are square or at required angle to base. Measures finished article with dial indicator, micrometer, vernier, height gauges, screw gauges, plug gauges, sine bar, slip gauge, etc according to prescribed accuracies. May make parts separately and assemble those with screws, rivets, pins, etc. as specified so as to make complete unit according to drawing. Dismantles or removes worn out, broken or defective parts using hand tools or power tools and replaces them by repaired or new ones. Performs repairing and maintenance work (including preventive maintenance) of simple machines, dismantles and replaces different components to construct circuit of Pneumatics and Hydraulics. Tests completed article/ assembly to ensure correct performance. May do simple turning of parts on machines and perform welding, brazing, and like operations. May explain heat treatment processes viz., annealing, hardening, tempering etc. May specialize in particular type of machine or product and be designated accordingly. May suggest alterations.

In addition Fitter have the ability to visualize the job, good coordination, mechanical attitude, manual dexterity and perform work related mathematical calculations.

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.

May be designated as Fitter Structural General according to nature of work done

Reference NCO 2015: 7214.0700 - Fitter General

4. NSQF LEVEL COMPLIANCE

NSQF level for Fitter Structural 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 Fitter Structural 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	FITTER STRUCTURAL
NCO - 2015	7214.0700
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 Apprenticeship	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 Fitter Structural Apprenticeship	1. Fitter

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 Fitter Structural 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

JIGS AND TEMPLATE MAKING

1. Making templates for simple objects – marking, cutting to size, Setting out and use of inter-sections points, reference points & reference lines, Allowance for machining and edge planning.
2. Making fixtures for assembly and Welding.
3. Making simple drilling jigs and templates.
4. Gauges for bending.

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5. Development on sheet metal for making bunkers or hoppers.
6. Setting out for three dimensional structures.
7. Marking gusset plates, joints section beams, joints columns.
8. Marking curved and bent plates & sections, Providing marks to facilitates assembly.
9. Inspection & checking.

PREPARATION

10. Cutting plates by guillotine shears, by cropper.
11. Cropping of sections.
12. Straightening plates and sections.
13. Edge planning.
14. Bending plates (hot and cold).
15. Punching, Press work, Nibbling.

RIVETING

16. Hand riveting hot.
17. Use of Pneumatic riveting.
18. Use of Hydraulic riveting.



Block – II

19. Safety precautions in gas & electric welding.
20. Use of hand tools used in gas welding & cutting.
21. Use of welding torch, regulation of flame.
22. Use of high pressure acetylene bottles.
23. Use of acetylene generators and oxygen cylinders.
24. Fusion runs with and without rods by gas.
25. Straight line beads on M.S. Sheets and plates by gas.
26. Butt joints on M.S. by gas welding/ brazing.
27. Use of hand tools used in electric welding.
28. Study of electric arc welding machines and regulation of current and voltage.
29. Straight line beads by electric welding on mild steel Using different sizes of electrodes.
30. Square butt joint, open corner joint, fillet tag and Tee joint by electric welding on mild steel.
31. Gas welding.
32. Preparation of joints for welding.
33. Tack welding techniques.
34. Single and multi-run welding techniques.
35. Special problems on assembling for welding.

CHIPPING AND GRINDING

36. Use of pneumatic chisels for chipping.
37. Removing welds and rivets.

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38. Grinding flush.

ASSEMBLY

- 39. Assembling of simple structures, simple trusses, end cleats, brackets to beams.
- 40. Use of lifting tackles, slings, lifting, devices, slinging fabricated structure for fitting.
- 41. Assembling of riveted joints.
- 42. Assembling of simple structures for welding,
- 43. Assembling of welding I-sections.
- 44. Use of level table for leveling and positioning.
- 45. Marking of simple fixtures.
- 46. Preventing or allowing for welding distortion, Correction of errors.
- 47. Assembling of tanks and vessels.
- 48. Fixing pipe and fitting vessels.
- 49. Use of jointing cements in vessels.
- 50. Use of lagging material and insulation in vessels.

PAINTING AND DESPATCH

- 51. Paints-Primary and finishing coats.
- 52. Distinguishing marks for dispatch and erection.
- 53. Loading lorries and wagons.
- 54. Lashing and tying loads.

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

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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. <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>	2.2 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. <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 tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	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 resources 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</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.	1. Instructions in Health & Safety precautions as applicable to the trade. 2. Marking out from drawings in mm/ inch. Marking for cutting to shape. As per job plan	Safety precautions: Safety at work- correct technique to avoid accidents. Safety precautions to be observed in general- particularly in the shop floor. Fire Extinguishers, protective equipment and protective clothing-their importance and use. Electrical safety and fuses. Knowledge of elementary first aid Description, use and care of different marking off and layout tools.
2.	3. Practice Chipping on surface and edge on Metal in different Thickness. 4. perform Grinding of Chisels on Grinding Machine Pedestal/Bench type	Description, use and care of different hand tools and holding devices. Common shapes of chisels (cold). Safety precautions for chipping. Method of chipping and cutting. Method of removing welds and rivets by chipping and grinding. Use of pneumatic chisels for chipping.
3.	5. Perform Sawing on different M.S. Metals 6. Draw marking by Vernier Height Gauge for drilling Operation 7. Perform Drilling and drill grinding Machines 8. Practice Dressing of grinding wheel.	Types of Drills, Their nomenclature and uses. Use of templates. Use of master plates for batch drilling. Types of grinding machines. Special safety precautions for grinding. Description, use and care of different grinding wheels.
4.	9. Perform Tapping Practice of different diameters on Metals 10. Practice of Threading with dies of different Sizes	Different thread forms and their uses.
5 - 6	11. Practice of Filing to marking and sizes as per given Job Plans 12. Use of micrometers. Outside & Inside & Depth 13-Use of vernier Caliper & Dial caliper	Description, use and care of different precision measuring instrument.

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	&Digital Caliper– linear Measurements etc.,	
7- 8	13. Practice Scraping & sharpening of scrapers. 14. Perform Drilling counter boring, counter sinking & spot facing 15. Practice Use of jigs and templates with location points	Jigs & templates making: Simple set outs. Intersections various tapes their purpose and use. Jigs-use of jigs for drilling plates and angles simple fixtures and clamping device. Use of jig bushes
9-11	16. Practice Simple marking out of sheet metal 17. Perform Making simple joints of sheet metal. 18. Perform Simple riveting & Rivetted Joints	Description and use of different marking and hand tools for sheet metal work. Riveting: Types of rivets and riveting, Hand riveting. Cold & Hot, Method of riveting. Use of pneumatic riveting. Method of holding up. Use of hydraulic riveting. Checking rivets, removing bad rivets.
12	19. Perform Reaming by Different types Reamers 20. Practice Scraping of bearing by Scraper Use of Various Scrapers 21. Identification of steel, C.I,SS, Brass , Etc By Spark Test & Steel Tables Reading, etc.	Description of croppers, shearing machines and guillotine shears, punching machines, edge planning machines and nibbling machines and their use. Plate roots and its use. Pyramid roll for plate bending of plates, angle iron, pipes, etc. Hot bending and joggling of angles. Bending angles and channels after cutting the flanges-blanking and press work
13.	Revision	
	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)
1-2	22. Marking of gusset plates, joint section beams. joints columns, curved and bent plates and section. Marking for built up section. Allowing for rolling tolerance. 23. Inspection of finished materials. Techniques of checking slope length shape etc	• Templates for cutting to size. Templates for drilling. Use of prick punch, back marks, standard back marks and cross centres. Edge distances. Templates for gussets, templates for marking angles, techniques of marking several items from a simple template. Template for marking joint sections. • Machining allowances- allowances allowing for distortion in welding and cutting. Allowances for temperature variations. Use of working points and intersection points.
3-4	24. Practice of Simple welding (Arc and Gas) 25. 23.Practice Of simple soldering 26. 24Draw Marking for beveling and chamfering. marking after assembly for welding, & marking of sloping members.	Welding & Gas cutting: Welding tools and welding accessories, protective clothing, etc. Different processes of welding - oxy-acetylene, electric and Thermal - Brief description & application, welding methods.Common gases used in welding- oxygen, hydrogen-Acetylene, TIG & MIG, CO₂ , Argon different types of joint and its application properties. Storage and use of various gasses used in welding. Gas cutting-profile and straight line-oxy-acetylene flame lighting and adjustment Use of different types of flames – oxidizing, reducing & neutral. Flame cutting-free hand, guided and mechanical. Flame cutting factors, Elementary electricity as applied to electric welding. Types of arc welding, carbon metallic, resistance etc. and application. Principal of arc welding. The welding arc-its characteristics, advantages and disadvantages, welding machines – D.C. Generators. A.C. Transformers-rectifiers-their description and operation, Different types of electrodes purposes of flux coating. Method of coating position of flux-characteristics of flux. Various welding position Edge preparation application. Method of heating of metals, Distortion-causes and effects. Method employed to minimize distortion. Types of welding. Welding of different metals, Techniques employed in gas

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		and arc welding. Common defects in arc and gas welding. Non destructive method of flow detection like M.P.T. Ultrasonic di-penetration, Radiography, knowledge of relevant I.S.I. specification regarding materials, fasteners, electrodes and tolerances, Safety precautions during welding 60 hrs
5-6	27. Practice of Fitting of mating parts. 28. Practice Cutting key way and fitting keys.	Description and use of different mechanical fasteners.
7-8	29. Practice of Fitting & removal of studs. 30. Practice of Assembly of Structural parts.	Simple techniques of assembly. Assembling of riveted plate girder trusses. Assembling of laced and lattice structures. Using fixture for clamping and location. Use of drifts for faring holes.
9-10	31. Perform & Demonstrate Repair works. 32. Use of gauges & templates & Practice On various Parts 33. Practice Use of sine bar & Slip gauges.	Rectification of mistakes and errors, slinging loads, Use of chain, wire sling, tackle, clamps, level table and level stallage. Marking of simple fixture, Preventing or allowing for welded distortion. Assembling of welded I-section. Assembling of cylindrical tanks including fitting and lining of vessels. Use of jointing cement. Lagging & insulation
11	PIPING WORK 34. Practice on Cutting, bending, threading, joining and assembly. 35. Draw Marking of pipes and intersections	Commonly used pipes- Use of tools such as pipe cutter, pipe wrenches, pipe vices, etc. Pipe threads-standard pipe threads- dies and taps. Standard pipe fitting methods of fitting or replacing the fitting – repair and erection of pipes line. Methods of preventing leaks at the Joints. pipe bending methods-use of bending fixture, pipe bending machine etc.
12	36. Practice on .Elementary concept of material handling like methods of slinging and use of various material handling equipment and fixtures.	Roof trusses-their description, types and use.
13	Revision	
	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.

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.	Properties of Material : properties - Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous Alloys.	Drawing Instruments : their uses Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing of lines and their application (Hidden, centre, construction, Extension, Dimension, Section) - Methods of Division of line segment
2.	Mass, Weight and Density: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals. Centre of gravity and its practical application.	Drawing of Geometrical Figures: Angle, Triangle -different types, Rectangle, Square, Rhombus, parallelogram, Circle and its elements..
3.	- Forces definition. - Definition and example of compressive, tensile, shear forces, axial and tangential forces.	Lettering and Numbering as per BIS SP46-2003: Single Stroke, Double Stroke, inclined, Upper case and Lower case
4.	Mensuration : parallelogram lengths of diagonals of square & rectangles. Pythagoras Theorem, Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Area of trapezoid,,	Dimensioning: - types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text
5.	Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere.	Method of presentation of Engineering Drawing - Pictorial View - Orthogonal View - Isometric view
6.	Area of cut-out regular surfaces: circle and segment and sector of circle.	Symbolic Representation (as per BIS SP:46-2003) of : - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints.

		- Electrical and electronics element - Piping joints and fittings
7.	- Volume of simple solid blocks - Volume of cut-out solids: hollow cylinders, frustum of cone, block section.	Construction of Geometrical Drawing Figures: - Polygons and their values of included angles. - Conic Sections (Ellipse)
8.	Work, Power and Energy: work, unit of work, power, unit of power, Horse power, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	- Drawing of Solid figures (Cube, Cuboids, Cone and Frustum of Cone) with dimensions.
9.	Friction – Limiting friction – measuring of friction – examples. Simple problems on straight and bell crank levers. Laws of friction, coefficient of friction and angle of friction. Problems on inclined plane.	- Free Hand sketch of hand tools and measuring tools used in the trade.



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Block – II		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration: - 30 hrs.)
1.	stress, strain and modules of elasticity, ultimate, strength, factor of safety and different types of stresses	Drawing of riveted joints, different types of threads, bolts, nuts, locking devices, keys, cotters, couplings, bearings, pulleys cotters screw joint, knuckle joint etc. Making drawings of lap and butt and single or double strap riveted joints.
2.	Elementary principle of triangle of forces and parallelogram of forces. Resolution and composition of forces. Application to lifting tackles like chain pulley block, crane, wall crane, etc. problems. Moment of a force-couples-simple problems. Example in simply supported and loaded beams- General conditions of equilibrium for a series of forces acting on a body. Stable, non stable and neutral equilibrium of bodies-simple explanation.	Free hand sketching of pipe joints-flanged, socket & screwed sleeve joints and preparation of drawings of pipe joints. Free hand sketching of simple machine parts and production of working diagrams
3.	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, Expansion of solids, liquids and gases due to heat, co-efficient of expansion. Brief description of transference of heat-conduction, convection and radiation.	- Construction of simple curves of interpretation-simple exercises. Development of surfaces of prism, cylinders, pyramids and cones
4.	Electricity and its various effects. Electric current-positive and negative terminals, use of switches and fuses. Types of current- AC, DC, Units of current, resistance and voltage; Simple electric circuit-Ohm's law-simple calculation. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy. Concept of earthing.	Reading of advanced blue prints including structural drawings and other allied items such as materials, list.
5.	Trigonometry: Trigonometric ratios, Trigonometric tables.	- Drawings of fabricated channels or I section Girders. - Drawings of fabricated channels

	- 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).	simple poof trusses, purlins, braced columns glazing or window frames and welded girders.
6.	Levers and Simple Machines: levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine.	- rawing of fabricated jobs like brackets, bed plates. D - Drawings for welding vessels, pipes, ducts, etc.



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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)

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

Block – I

JIGS AND TEMPLATE MAKING

1. Making templates for simple objects – marking, cutting to size, Setting out and use of inter-sections points, reference points & reference lines, Allowance for machining and edge planning.
2. Making fixtures for assembly and Welding.
3. Making simple drilling jigs and templates.
4. Gauges for bending.
5. Development on sheet metal for making bunkers or hoppers.
6. Setting out for three dimensional structures.
7. Marking gusset plates, joints section beams, joints columns.
8. Marking curved and bent plates & sections, Providing marks to facilitates assembly.
9. Inspection & checking.

PREPARATION

10. Cutting plates by guillotine shears, by cropper.
11. Cropping of sections.
12. Straightening plates and sections.
13. Edge planning.
14. Bending plates (hot and cold).
15. Punching, Press work, Nibbling.

RIVETING

16. Hand riveting hot.
17. Use of Pneumatic riveting.
18. Use of Hydraulic riveting.

Block – II

WELDING AND GAS CUTTING

19. Safety precautions in gas & electric welding.
20. Use of hand tools used in gas welding & cutting.
21. Use of welding torch, regulation of flame.

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22. Use of high pressure acetylene bottles.
23. Use of acetylene generators and oxygen cylinders.
24. Fusion runs with and without rods by gas.
25. Straight line beads on M.S. Sheets and plates by gas.
26. Butt joints on M.S. by gas welding/ brazing.
27. Use of hand tools used in electric welding.
28. Study of electric arc welding machines and regulation of current and voltage.
29. Straight line beads by electric welding on mild steel Using different sizes of electrodes.
30. Square butt joint, open corner joint, fillet tag and Tee joint by electric welding on mild steel.
31. Gas welding.
32. Preparation of joints for welding.
33. Tack welding techniques.
34. Single and multi-run welding techniques.
35. Special problems on assembling for welding.

CHIPPING AND GRINDING

36. Use of pneumatic chisels for chipping.
37. Removing welds and rivets.
38. Grinding flush.

ASSEMBLY

39. Assembling of simple structures, simple trusses, end cleats, brackets to beams.
40. Use of lifting tackles, slings, lifting, devices, slinging fabricated structure for fitting.
41. Assembling of riveted joints.
42. Assembling of simple structures for welding.
43. Assembling of welding I-sections.
44. Use of level table for leveling and positioning.
45. Marking of simple fixtures.
46. Preventing or allowing for welding distortion, Correction of errors.
47. Assembling of tanks and vessels.
48. Fixing pipe and fitting vessels.
49. Use of jointing cements in vessels.
50. Use of lagging material and insulation in vessels.

PAINTING AND DESPATCH

51. Paints-Primary and finishing coats.
52. Distinguishing marks for dispatch and erection.

53. Loading lorries and wagons.

54. Lashing and tying loads.

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.



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INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

FITTER STRUCTURAL			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-17is required additionally)			
Sl. no.	Name of the Tool &Equipments	Specification	Quantity (indicative)
1	Steel Rule with metric graduation	15 cm	21 nos.
2	Try Square with blade.	15 cm	21 nos.
3	Caliper inside spring.	15 cm	21 nos.
4	Caliper hermaphrodite/Jenny Caliper	15 cm	21 nos.
5	Caliper outside spring	15 cm	21 nos.
6	Divider spring	15 cm	21 nos.
7	Straight Scriber	15 cm	21 nos.
8	Center Punch	10 cm	21 nos.
9	Screw driver	15 cm	21 nos.
10	Chisel cold flat	10 cm	21 nos.
11	Hammer ball pane With handle	0.45 Kg	21 nos.
12	Hammer ball pane with handle.	0.22 kg	21 nos.
13	File flat second cut	25 cm	21 nos.
14	File flat smooth	25 cm	21 nos.
15	File half round second cut	15 cm	21 nos.
16	Hacksaw frame fixed	30 cm	21 nos.
17	Safety goggles		21 nos.
B : INSTRUMENTS & GENERAL SHOP OUT FIT			
Sl. No.	Name of the items	Specification	Quantity (indicative)
18.	Steel Rule	30 cm	4 nos.
19.	Steel Rule	60 cm.	4 nos.
20.	Straight edge	45 cm steel	2 nos.
21.	Surface plate	45 x 45 cm CI / Granite.	1 nos.
22.	Marking table	91 x 91 x 122 cm.	1 no.
23.	Universal scribing block	22 cm.	2 nos.
24.	V-Block pair with clamps	7 cm and 15 cm	2 nos.
25.	Square adjustable blade.	15 cm	2 nos.
26.	Angle plate	10 x 20 cm.	1 nos.
27.	Spirit Level metal	15 cm	1 no.

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28.	Punch letter set.	3 mm	1 no.
29.	Punch number set	3 mm.	1 no.
30.	Punch prick	6mm	2 nos.
31.	Portable hand drill (Electric)	0 to 6 mm	1 nos.
32.	Drill twist straight shank	1.5 to 12 mm by 0.5 mm	1 Set
33.	Drill twist straight shank	8 mm to 15 mm by ½ mm	1 Set
34.	Taps and dies complete set in box B.A	Set in box B.A	1 no.
35.	Taps and dies complete set in box whit-worth.	Set in box whit worth	1 no.
36.	Taps and dies complete set	box 3-18 mm set of 10	1 no.
37.	File warding smooth	15 cm	4 nos.
38.	File knife edge smooth	15 cm	4 nos.
39.	File cut saw smooth	15 cm	2 nos.
40.	File Rounded edge smooth	15 cm	2 nos.
41.	File triangular smooth	15 cm	2 nos.
42.	File round second cut	20 cm	4 nos.
43.	File square second cut	15 cm	4 nos.
44.	File square second cut	25 cm	4 nos.
45.	Feeler gauge 10 blades	25 cm	1 set
46.	File triangular second cut.	20 cm	4 nos.
47.	File triangular second cut.	15 cm	4 nos.
48.	File flat second cut.	30 cm	4 nos.
49.	File flat bastard	20 cm	4 nos.
50.	File flat bastard.	30 cm	4 nos.
51.	File half round second cut.	25 cm	4 nos.
52.	File Swiss type needle set of 12.	Set of 12 nos	2 sets
53.	File round bastard.	30 cm	4 nos.
54.	File hand second cut.	15 cm	8 nos.
55.	File card		4 nos.
56.	Oil Stone	15 cm x 5 cm x 2.5 cm	4 nos.
57.	Stone carborandum	15 cm x 5 cm x 5 cm x 4 cm.	2 nos.
58.	Oil Can	0.25 liters.	2 nos.
59.	Plier combination	15 cm	2 nos.
60.	Soldering Iron	350 watts	2 nos.
61.	Blow Lamp.	0.50 liters	2 nos.
62.	Spanner D.E		2 set.
63.	Spanner adjustable 15 cm	. 6 -26 mm set of 10 pcs.	1 nos.
64.	Interchangeable ratchet socket set with a 12 mm driver,	Size 10-32 mm set of 18 socket & attachments.	1 set
65.	Box spanner set	6-25 mm set of 8 with Tommy bar.	1 set
66.	Glass magnifying	7 cm	1 nos.
67.	Clamp toolmaker	5 cm and 7.5 cm set of 2.	2 nos.

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68.	Clamp "C"	5 cm	2 nos.
69.	Clamp "C"	10 cm	2 nos.
70.	Hand Reamer adjustable	cover max 9 ,12,18mm – set of 3	1 set
71.	Hand Reamer taper	4 -9mm set of 6 OR 4 -7 mm set of 4.	1 set
72.	Reamer parallel	12 – 16mm set of 5.	1 no.
73.	Scraper flat	15 cm.	4 nos.
74.	Scraper triangular	15 cm	2 nos.
75.	Scraper half round	15cm	2 nos.
76.	Chisel cold cross cut	9 mm	2nos
77.	Chisel cold flat	19 mm	2 nos.
78.	Chisel cold round nose.	9 mm	2 nos.
79.	Stud Extractor EZY – out	Std.size	2 nos.
80.	Combination Set	30 cm.	2 nos.
81.	Micrometer out side outside.	0-25 mm	2 nos.
82.	Micrometer inside with extension rods.	25 – 50 mm	1 no.
83.	Vernier caliper	15 cm	2 no.
84.	Vernier height gauges.	30 cm	1 no.
85.	Vernier bevel protractor.	0-360 degree by 5 minutes	1 no.
86.	Screw pitch gauge.		1 no.
87.	Wire gauge, metric standard.		1 no.
88.	Drill twist Taper Shank	12 mm to 25 mm x 1.5 mm	1 no
89.	Drill chuck	12 mm.	1 no.
90.	Pipe wrench	40 cm	1 no.
91.	Pipe vice	100mm	1 no.
92.	Adjustable pipe die	set cover pipe size 15, 20, 25,32,38,50 mm with die stock	1 no.
93.	Wheel dresser (One for 4 units).	Std.size	1 no
94.	Machine vice	10 cm.	1 no.
95.	Machine vice.	15 cm	1 no.
96.	Sleeve drill Morse	0 – 1, 1 – 2, 2 – 3.	1 Set
97.	Vice bench	12 cm	20 nos.
98.	Vice leg	10 cm	2 nos.
99.	Bench working	240 x 120 x 90 cm.	4 nos.
100.	Almirah.	180 x 90 x 45 cm	2 nos.
101.	Lockers with 8 drawers (standard size).	Std. size 8 drawers	3 nos.
102.	Metal rack	182 x 182 x 45 cm	1 no.
103.	Black board with easel.		1 no.
104.	Fire extinguisher (For 4 Units)		2 nos.
105.	Fire buckets.		2 nos.
106.	Wing compass	25.4 cm or 30 cm.	2 nos.
107.	Hand hammer	1 kg. with handle.	2 nos.

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108.	Torque wrench)	(14 to 68 Nm	1 no.
109.	Discussion Table	8' x 4' x 2½	2
110.	First- aid box		As required

C : GENERAL MACHINERY INSTALLATIONS:-

112.	Drilling machine pillar sensitive 0-20 mm cap with swivel table motorized with chuck & key.	0-20 mm capacity	1 no.
113.	Drilling machine bench sensitive 0-12 mm cap motorized with chuck and key.	0-12 mm capacity	2 nos.
114.	D.E. pedestal Grinding machine with 200mm diameter wheels rough and smooth with twist drill grinding attachment.	200 mm diameter wheels	1 no.
115.	Transformer welding set 150 amps.-continuous welding current, with all accessories and electrode holder	150 Amps	1 set
116.	Oxygen-acetylene gas welding set equipment with hoses, regulator and other accessories.	Std. size	1 set

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**

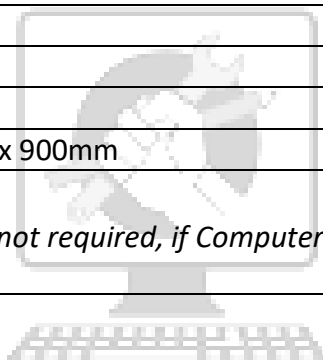
TRADE: FITTER STRUCTURAL**LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES**

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)	45 degree(250x1.5 mm)	20+1 set
3.	Set square celluloid 30°-60° (250 X 1.5 mm)	30-60 degree(250x1.5 mm)	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board (700mm x500 mm) IS: 1444	700 mm x 500 mm	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>		



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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														