

CURRICULUM

FOR THE TRADE OF

FITTER (Dual Mode)

UNDER

DUAL TRAINING SYSTEM

BY



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

PROPOSED TIME DISTRIBUTION FOR FITTER TRADE UNDER
INDUSTRY INSTITUTE - TRAINING SCHEME

BLOCK WITH DURATION	THEORY	PRAC.	WSC/ CAL	ENGG. DRG.	EMP. SKILL	ECA, LIB. & OTHERS	REM.
BLOCK – I (12 months/52 Weeks duration) Institute level trg.	510 hrs.	830 hrs.	170 hrs.	250 hrs.	110 hrs.	50 hrs.	160 hrs. Revision & Test
BLOCK – II (09 months /39 weeks duration) Industry level trg.	---	1560 HRS.	---	---	---	---	---
BLOCK – III (3 months/ 13 Weeks duration) Institute level trg.	100 hrs.	210 hrs. (Practical practice and submission of report related to industry training)	50 hrs.	60 hrs.	---	20 hrs.	Last 2 weeks revision & exam.
GRAND TOTAL	610 HRS.	2600 HRS.	220 HRS.	310 HRS.	110 HRS.	70 HRS.	240 HRS.
Total duration of training inclusive of Industry & Institute is 2 years (4160 HRS.)							

GENERAL INFORMATION FOR INSTITUTE (ITI)

1. **Name of the Trade** : **FITTER (Dual mode)**
2. **N.C.O. Code No.** : 842.10, 842.15
3. **Duration of Craftsmen Training:** Two years (Three Blocks).
4. **Power norms** : 3.51 KW
5. **Space norms** : 88 Sq.mt.
6. **Entry Qualification** : Passed 10th Class with Science and Mathematics under 10+2 system of Education or its equivalent
7. **Trainees per unit** : 16 (Max. supernumeraries seats: 5)
- 8a. **Qualification for Instructors** : Degree in Mechanical Engineering from recognized university with one year post qualification experience in the relevant field
- OR
- Diploma in Mechanical Engineering from recognized Board of Technical Education with two years post qualification experience in the relevant field
- OR
- NTC/NAC in the Trade of “Fitter” with 3 years post qualification experience in the relevant field.
- 8b. **Desirable qualification** : Preference will be given to a candidate with Craft Instructor Certificate (CIC) in **Fitter Trade**.

Note:

- (i) Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.
- (ii) Instructor qualification for WCS and E.D, as per the training manual.

Distribution of training on Hourly basis:

Total hours /week	Trade practical	Trade theory	Work shop Cal. &Sc.	Engg. Drawing	Employability skills	Extra curricular activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours

SYLLABUS CONTENT WITH TIME STRUCTURE FOR FITTER TRADE

Block – I

Duration- 12 Months (52 weeks)

Institute Level Training: -

Sl. No.	Practical Duration:- 830 hrs.	Theory Duration:- 510 hrs.
1.	<p>Importance of trade training, List of tools & Machinery used in the trade. Health & Safety: Introduction to safety equipments and their uses. Introduction of first aid, operation of Electrical mains.</p> <p>Occupational Safety & Health Importance of housekeeping & good shop floor practices. Health, Safety and Environment guidelines, legislations & regulations as applicable. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Basic safety introduction, Personal protective Equipment's(PPE):- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Use of Fire extinguishers.</p>	<p>Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept & its application. Response to emergencies e.g.; power failure, fire, and system failure. Fire precautions-causes and types of fires, precautions against out break of fire. Fire Extinguishers-types and use.</p>
2.	<p>Identification of tools & equipments as per desired specifications for marking & sawing. Selection of material as per application Visual inspection of raw material for rusting, scaling, corrosion etc., Marking out lines, gripping suitably in vice jaws, hacksawing to given dimensions, sawing different types of metals of different sections.</p> <p>Filing Channel, Parallel. Filing- Flat and square (Rough finish). Filing practice, surface filing, marking of straight and parallel lines with odd leg calipers and steel rule, marking practice with dividers, odd leg calipers and steel rule (circles, ARCs, parallel lines).</p>	<p>Linear measurements- its units, dividers, calipers, hermaphrodite, centre punch, dot punch, their description and uses of different types of hammers. Description, use and care of 'V' Blocks, marking off table. Bench vice construction, types, uses, care & maintenance, vice clamps, hacksaw frames and blades, specification, description, types and their uses, method of using hacksaws. Files- specifications, description, materials, grades, cuts, file elements, uses. Measuring standards (English, Metric Units), angular measurements, subdivisions, try square, ordinary depth gauge, protractor- description, uses and cares.</p>

3.	<p>Marking off straight lines and ARCs using scribing block and dividers, chipping flat surfaces along a marked line. Marking, filing, filing square, use of tri-square.</p>	<p>Marking off and layout tools, dividers, scribing block, odd leg calipers, punches- description, classification, material, care & maintenance. Calipers- types, material, constructional details, uses, care & maintenance of cold chisels- materials, types, cutting angles. Marking media, marking blue, Prussian blue, red lead, chalk and their special application, description. Use, care and maintenance of scribing block.</p>
4.	<p>Marking according to simple blue prints for locating, position of holes, scribing lines on chalked surfaces with marking tools, finding center of round bar with the help of 'V' block and marking block. Joining straight line to an ARC.</p>	
5.	<p>Chipping, Chip slots & oils grooves (Straight). Filing flat, square, and parallel to an accuracy of 0.5mm. Chip curve along a line-mark out, key ways at various angles & cut key ways. File thin metal to an accuracy of 0.5 mm. Chip & chamfer, grooving and slotting</p>	<p>Surface plate and auxiliary marking equipment, 'V' block, angle plates, parallel block, description, types and uses, workshop surface plate- their uses, accuracy, care and maintenance. Types of files- convexing, taper, needle, care and maintenance of files, various types of keys, allowable clearances & tapers, types, uses of key pullers. Physical properties of engineering metal: colour, weight, structure, and conductivity, magnetic, fusibility, specific gravity. Mechanical properties: ductility, malleability hardness, brittleness, toughness, tenacity, and elasticity.</p>
6.	<p>Saw along a straight line, curved line, on different sections of metal. Straight saw on thick section, M.S. angle and pipes. File steps and finish with smooth file accuracy \pm 0.25 mm. File and saw on M.S. Square and pipe.</p>	<p>Power Saw ,band saw, Circular saw machines used for metal sections cutting Micrometer- outside and inside – principle, constructional features, parts graduation, leading, use and care. Micrometer depth gauge, parts, graduation, leading, use and care. Digital micrometer.</p>
7.	<p>File radius along a marked line (Convex & concave) & match. Chip sheet metal (shearing). Chip step and file. Mark off and drill through holes, drill and tap on M.S. flat, Punch letter and number (letter punch and number punch), use of different punches. Cutting threads using dies.</p>	<p>Vernier calipers, principle, construction, graduations, reading, use and care. Vernier bevel protractor, construction, graduations, reading, use and care, dial Vernier Caliper, Digital vernier caliper. Drilling processes: common type (bench type, pillar type, radial type), gang and multiple drilling machine. Determination of tap drill size.</p>

8.	<p>Prepare forge. Fire for heating metals. Judge the forging temperature of various metals. Forge M.S. round rod to square Forge flat chisel, grind. Forge – punches, screw drivers, chisels, grind them to shape and heat treat to requirement, bending metals to angles, curves & twisting, Preparation of brackets. Marking of straight lines, circles, profiles and various geometrical shapes and cutting the sheets with snips. Marking out of simple development, marking out for flaps for soldering and sweating.</p>	<p>Safety precautions to be observed in a smith shop, forge - necessity, description uses, fuel used for heating, bellows blowers, description and uses Anvil and swage blocks. Description and uses. Forging tools- hammers- band and sledge, description and uses. Chisels, set hammers, flatters, hardier, fuller swage & uses. Measuring and checking tools- steel rule, brass rule, calipers, try square, description and uses. General idea about the main operations performed in a forging shop such as upsetting drawing, twisting, bending, punching, drilling, and welding. Metallurgical and metal working processes such as Heat treatment, various heat treatment methods -normalizing, annealing, hardening, case hardening and tempering. Power hammer – construction, features, method of operating and uses. Safety precautions to be observed in a sheet metal workshop, sheet and sizes, Commercial sizes and various types of metal sheets, coated sheets and their uses as per BIS specifications.</p>
9.	<p>Make various joints: wiring, hemming, soldering and brazing, form locked, grooved and knocked up single hem straight and curved edges form double hemming,. Punch holes-using hollow and solid punches. Do lap and butt joints.</p>	<p>Marking and measuring tools, wing compass, Prick punch, tin man’s square tools, snips, types and uses. Tin man’s hammers and mallets type-sheet metal tools, Soldering iron, types, specifications, uses. Trammel- description, parts, uses. Hand grooves- specifications and uses. Stakes-bench types, parts, their uses. Various types of metal joints, their selection and application, tolerance for various joints, their selection & application. Wired edges -</p>
10.	<p>Bend sheet metal into various curvature form, wired edges- straight and curves, fold sheet metal at angle using stakes. Bend sheet metal to various curvatures. Make simple Square, container with wired edge and fix handle. Make square tray with square soldered corner Practice in soft soldering and silver soldering. Make riveted lap and butt joint. Make funnel as per development and solder joints. Drilling for riveting. Riveting with as many types of rivet as available, use of counter sunk head rivets.</p>	<p>Solders-composition of various types of solders, and their heating media of soldering iron, fluxes types, selection and application-joints Rivets-Tin man’s rivets types, sizes, and selection for various works. Riveting tools, dolly snaps description and uses. Method of riveting, shearing machine-description, parts and uses.</p>

11.	<p>Welding - Striking and maintaining ARC, laying Straight-line bead. Making square, butt joint and 'T' fillet joint-gas and ARC. Do setting up of flames, fusion runs with and without filler rod, and gas. Make butt weld and corner, fillet in ARC welding. Identify different ferrous metals by spark test</p>	<p>Safety-importance of safety and general precautions observed in a welding shop. Precautions in electric and gas welding. (Before, during, after) Introduction to safety equipment and their uses. Machines and accessories, welding transformer, welding generators. Hand tools: Hammers, welding description, types and uses, description, principle, method of operating, carbon dioxide welding. H.P. welding equipment: description, principle, method of operating L.P. welding equipment: description, principle, method of operating. Types of Joints-Butt and fillet as per BIS SP: 46-1988 specifications. Gases and gas cylinder description, kinds, main difference and uses.</p>
12.	<p>Gas cutting of MS plates</p>	<p>Setting up parameters for ARC welding machines-selection of Welding electrodes Oxygen acetylene cutting-machine description, parts, uses, method of handling, cutting torch-description, parts, function and uses.</p>
13.	<p>Mark off and drill through holes, drill on M.S. flat, file radius and profile to suit gauge. Counter sink, counter bore and ream split fit (three piece fitting). Form internal threads with taps to standard size (through holes and blind holes) – Drill through hole and tap drill blind hole and tap, prepare studs and bolt.</p>	<p>Drill- material, types, (Taper shank, straight shank) parts and sizes. Drill angle-cutting angle for different materials, cutting speed feed. R.P.M. for different materials. Drill holding devices- material, construction and their uses. Counter sink, counter bore and spot facing-tools and nomenclature, Reamer- material, types (Hand and machine reamer), kinds, parts and their uses, determining hole size (or reaming), Reaming procedure. Screw threads: terminology, parts, types and their uses. Screw pitch gauge: material parts and uses. Taps British standard (B.S.W., B.S.F., B.A. & B.S.P.) and metric /BIS (course and fine) material, parts (shank body, flute, cutting edge). Tap wrench: material, parts, types (solid & adjustable types) and their uses removal of broken tap, studs (tap stud extractor).</p>

14.	Form external threads with dies to standard size. Prepare nuts and match with bolts. Step fit, angular fit, file and make angle, surfaces (Bevel gauge accuracy 1 degree) make simple open and sliding fits.	Dies: British standard, metric and BIS standard, material, parts, types, Method of using dies. Die stock: material, parts and uses. Drill troubles: causes and remedy. Equality of lips, correct clearance, dead centre, length of lips. Drill kinds: Fraction, metric, letters and numbers, grinding of drill.
15.	Enlarge hole and increase internal dia. File cylindrical surfaces. Make open fitting of curved profiles. Make the circles by binding previously drilled hole. Test angular match up.	Grinding wheel: Abrasive, grade structures, bond, specification, use, mounting and dressing. Bench grinder parts and use-radius gauge, fillet gauge, material, construction, parts function and metric, different dimensions, convex and concave uses care and maintenance. Radius gauge, feeler gauge, hole gauge, and their uses.
16.	Inside square fit, make combined open and sliding fit, straight sides 'T' fit. File fit- combined, open angular and sliding sides. File internal angles 30minutes accuracy open, angular fit.	Interchangeability: Necessity in Engg, field definition, BIS. Definition, types of limit, terminology of limits and fits-basic size, actual size, deviation, high and low limit, zero line, tolerance zone Different standard systems of fits and limits. British standard system, BIS system Method of expressing tolerance as per BIS Fits : Definition, types description of each with sketch .Vernier height gauge : material construction, parts, graduations (English & Metric) uses, care and maintenance, Pig Iron : manufacturing process (by using)Blast furnace types, of pig Iron , properties and uses.
17.	Make sliding fit with angles other than 90° sliding fit with an angle. Make simple bracket by bending and twisting of non-ferrous metal. Drill small holes (2mm) Drill holes on sheet metal, bend short for round bracket.	Cast Iron: manufacturing process by using (cupola furnace) types, properties and uses. Wrought iron- : manufacturing process (Fuddling and Astor process) properties and uses. Steel: manufacturing process plain carbon steels, types, properties and uses. Non-ferrous metals (copper, aluminum, tin, lead, zinc) properties and uses.
18.	Scrap on flat surfaces, scrap on curved surfaces and scrap surface parallels and test. Make & assemble, sliding flats, plain surfaces. Check for blue math of bearing surfaces- both flat and curved surfaces by witworth method.	Simple scraper- cir., flat, half round, triangular and hook scraper and their uses. Blue matching of scraped surfaces (flat and curved bearing surfaces)

19.	<p>File and fit combined radius and angular surface (accuracy ± 0.5 mm), angular and radius fit. Locate accurate holes. Make accurate hole for stud fit. Fasten mechanical components / sub assemblies together using screws, bolts and collars using hand tools.</p>	<p>Vernier micrometer, material, parts, graduation, use, care and maintenance. Calibration of measuring instruments Introduction to mechanical fasteners and its uses. Screw thread micrometer: Construction, graduation and use. Dial test indicator, construction, parts, material, graduation, Method of use,. Care and maintenance. Digital dial indicator. Comparators-measurement of quality in the cylinder bores.</p> <hr/> <p>Preventive maintenance-objective and function of P.M., section inspection. Visual and detailed, lubrication survey, system of symbol and colour coding. Revision, simple estimation of materials, use of handbooks and reference table. Possible causes for assembly failures and remedies. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing, and torquing. Dowel pins: material, construction, types, accuracy and uses.</p>
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20.	<p>True job on four jaw chuck using knife tool, face both the ends for holding between centers, Using roughing tool parallel turn ± 0.1 mm. Measure the diameter using outside caliper and steel rule.</p> <p>Lathe operations- the facing, parting and form tools, plain turn, step turn, holding job in three jaw chuck- deburr, chamfer-corner, round, the ends, Shoulder turn: square, filleted, beveled undercut shoulder, turning-filleted under cut, square beveled.</p>	<p>Safely precautions to be observed while working on a lathe, Lathe specifications, and constructional features. Lathe main parts descriptions- bed, head stock, carriage, tail stock, feeding and thread cutting mechanisms. Holding of job between centers, works with catch plate, dog, simple description of a facing and roughing tool and their applications.</p> <p>Lathe cutting tools- Brief study of the nomenclature of Lathe cutting tools and necessity of correct grinding, solid and tipped, throw away type tools, cutting speed and feed and comparison for H.S.S., carbide tools. Use of coolants and lubricants.</p>
21.	<p>Cut grooves- square, round 'V' groove, Make a mandrel-turn diameter to sizes. Knurl the job.</p> <p>Bore holes –spot face, pilot drill, enlarge hole, using boring tools, make a bush step bore-cut recess, turn hole diameter to sizes.</p> <p>Turn taper (internal and external). Turn taper pins.</p> <p>Turn standard tapers to suit with gauge.</p>	<p>Chucks and chucking the independent four-jaw chuck. Reversible features of jaws, the back plate, Method of clearing the thread of the chuck-mounting and dismounting, chucks, chucking true, face plate, drilling - method of holding drills in the tail stock, Boring tools and enlargement of holes.</p> <p>General turning operations- parallel or straight, turning. Stepped turning, grooving, and shape of tools for the above operations.</p> <p>Appropriate method of holding the tool on tool post or tool rest, Knurling: - tools description, grade, uses, speed and feed, coolant for knurling, speed, feed calculation.</p> <p>Taper – definition, use and method of expressing tapers. Standard tapers-taper, calculations morse taper.</p>
22.	<p>Threading practice by using cut threads using taps, dies on lathe by hand, 'V' thread – external.</p> <p>Prepare a nut and match with the bolt.</p>	<p>Screw thread definition – uses and application. Terminology of screw threads, square, worm, buttress, acme (non standard-screw threads),Principle of cutting screw thread in centre lathe –principle of chasing the screw thread – use of centre gauge, setting tool for cutting internal and external threads, use of screw pitch gauge for checking the screw thread.</p> <p>Screws: material, different types (inch & metric), uses</p> <p>Testing scraped surfaces: ordinary surfaces without a master plate.</p>

23.	Use of snap gauge for checking a dia of 10 ± 0.02 mm.	<p>Special files: types (pillar, Dread naught, Barrow, warding) description.</p> <p>System of drill size, Fractional size: number, letter and metric. Templates and gauges- Introduction, necessity, types. Limit gauge: Ring gauge, snap gauge, plug gauge, description and uses.</p> <p>Description and uses of gauge- types (feeler, screw, pitch, radius, wire gauge)</p>
24.	Use of centre, squares, drills gauges.	<p>Slip gauge: Necessity of using, classification & accuracy, set of blocks (English and Metric). Details of slip gauge. Metric sets 46: 103: 112. Wringing and building up of slip gauge and care and maintenance. Application of slip gauges for measuring, Sine bar-Principle, application & specification. Procedure to check adherence to specification and quality standards.</p> <p>Locking device: Nuts- types (lock nut castle nut, slotted nuts, swam nut, grooved nut) Description and use.</p>
25.	Marking out as per Blue print, drilling, straight and curve filing. Threading with die, cutting slot, and cutting internal threads with taps, making an adjustable spanner.	<p>Lapping: Application of lapping, material for lapping tools, lapping abrasives, charging of lapping tool. Surface finish importance, equipment for testing-terms relation to surface finish. Equipment for tasting surfaces quality – dimensional tolerances of surface finish.</p> <p>Honing: Application of honing, material for honing, tools shapes, grades, honing abrasives. Frosting- its aim and the methods of performance.</p>
26.	Flaring of pipes and pipe joints, Cutting & Threading of pipe length. Fitting of pipes as per sketch. Conditions used for pipe work to be followed.	<p>Manufacture: The name and types of gauge commonly used in gauging finished product-Method of selective assembly ‘Go’ system of gauges, hole plug basis of standardization</p> <p>Bearing-Introduction, classification (Journal and Thrust), Description of each, ball bearing: Single row, double row, description of each, and advantages of double row.</p>

27.		<p>Roller and needle bearings: Types of roller bearing. Description & use of each</p> <p>Synthetic materials for bearing: The plastic laminate materials, their properties and uses in bearings such as phenolic, teflon polyamide (nylon).</p> <p>Method of fitting ball and roller bearings</p> <p>Bearing metals – types, composition and uses, lubricants purpose of using different types, description and uses of each type</p> <p>Hardening and tempering, purpose of each method, tempering colour chart.</p> <p>Annealing and normalising, purpose of each method.</p> <p>Case hardening and carburising and its methods, process of carburising (solid, liquid and gas).</p>
28.		<p>Solder and soldering: Introduction-types of solder and flux. Method of soldering, Hard solder- Introduction, types and method of brazing.</p> <p>Production of gauges, templates and jigs. The objective of importance for preparing interchangeable components.</p> <p>Drilling jig-constructural features, types and uses.</p> <p>Fixtures-Constructural features, types and uses.</p>
29.		<p>Pipes and pipe fitting- commonly used pipes. Pipe schedule and standard sizes. Pipe bending methods. Use of bending fixture, pipe threads-Std. Pipe threads Die and Tap, pipe vices.</p> <p>Standard pipefitting-. Methods of fitting or replacing the above fitting, repairs and erection on rainwater drainage pipes and house hold taps and pipe work. Use of tools such as pipe cutters, pipe wrenches, pipe dies, and tap, pipe bending machine etc.</p>

30.		<p>Working material with finished surface as aluminium, duralumin, stainless steel, the importance of keeping the work free from rust and corrosion. The various coatings used to protect metals, protection coat by heat and electrical deposit treatments. Treatments and provide a pleasing finish as chromium silver plating and nickel plating, and galvanising.</p> <p>Aluminium and its alloys. Uses, advantages and disadvantages, weight and strength as compared with steel.</p>
31.		<p>Tapers on keys and cotters permissible by various standards. Discuss non-ferrous metals as brass, phosphor bronze, gunmetal, copper, aluminium etc. Their composition and purposes where and why used, advantages for specific purposes, surface wearing properties of bronze and brass.</p> <p>Power transmission elements. The object of belts, their sizes and specifications, materials of which the belts are made, selection of the type of belts with the consideration of weather, load and tension methods of joining leather belts.</p> <p>Vee belts and their advantages and disadvantages, Use of commercial belts, dressing and resin creep and slipping, calculation.</p>
32.		<p>Power transmissions, coupling types-flange coupling,-Hooks coupling-universal coupling and their different uses.</p> <p>Pulleys-types-solid, split and 'V' belt pulleys, standard calculation for determining size crowning of faces-loose and fast pulleys-jockey pulley. Types of drives-open and cross belt drives. The geometrical explanation of the belt drivers at an angle.</p>

33.		<p>Power transmission –by gears, most common form spur gear, set names of some essential parts of the set-The pitch circles, Diametral pitch, velocity ratio of a gear set, Helical gear, herring bone gears, bevel gearing, spiral bevel gearing, hypoid gearing, pinion and rack, worm gearing, velocity ratio of worm gearing. Repair to gear teeth by building up and dovetail method.</p> <p>Method of fixing geared wheels for various purpose drives. General cause of the wear and tear of the toothed wheels and their remedies, method of fitting spiral gears, helical gears, bevel gears, worm and worm wheels in relation to required drive. Care and maintenance of gears.</p>
34.		<p>Lubrication and lubricants- Method of lubrication. A good lubricant, viscosity of the lubricant, Main property of lubricant. How a film of oil is formed in journal. Bearings, method of lubrication-gravity feed, force (pressure) feed, splash lubrication. Cutting lubricants and coolants: Soluble off soaps, suds-paraffin, soda water, common lubricating oils and their commercial names, selection of lubricants. Chains, wire ropes and clutches for power transmission. Their types and brief description.</p> <p>Discuss the various rivets shape and form of heads, riveting tools for drawing up the importance of correct head size. The spacing of rivets. Flash riveting, use of correct tools, compare hot and cold riveting.</p>
35.		<p>Importance of Technical English terms used in industry –(in simple definition only)Technical forms, process charts, activity logs, in required formats of industry, estimation, cycle time, productivity reports, job cards.</p> <p>Installation, maintenance and overhaul of machinery and engineering equipment and Hydraulics & pneumatic symbols & exercise. Hydraulics pneumatic circuits.</p> <p>Clutch: Type, positive clutch (straight tooth type, angular tooth type) .</p>

36.		Washers-Types and calculation of washer sizes. The making of joints and fitting packing. The use of lifting appliances, extractor process and their use. Practical method of obtaining mechanical advantage. The slings and handling of heavy machinery, special precautions in the removal and replacement of heavy parts. Foundation bolt: types (rag, Lewis cotter bolt) description of each erection tools, pulley block, crow bar, spirit level, Plumb bob, pipe 2 X 4', wire rope, manila rope, wooden block.
37.	Revision & Examination	

NOTE: - Maximum uses of video demonstration and other IT based teaching aids may be adopted to deliver the theoretical knowledge.

Syllabus for

EMPLOYABILITY SKILLS

GENERAL INFORMATION
(Employability Skill)

1. **Name of the subject:** EMPLOYABILITY SKILLS
2. **Hours of Instruction:** 110 Hrs.
3. **Examination:** The examination will be held at the end of the training.
4. **Instructor Qualification:**

MBA OR BBA with two years experience OR Graduate in Sociology/ Social Welfare/ Economics with Two years experience OR Graduate/ Diploma with Two years experience and trained in Employability Skills from DGET institutes

AND

Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above

OR

Existing Social Studies Instructors duly trained in Employability Skills from DGET institutes

5. **Instructor:**

One full time regular instructor shall be engaged on every 240 numbers of trainees for teaching the subject “Employability Skills”. One additional full time regular instructor would be required on increase in every 240 trainees. Wherever the trainees are less than 240 or part thereof, a part-time instructor may be engaged to teach the subject.

ALLOTMENT OF TIME AND MARKS AMONG THE TOPICS

Sl. No.	Topics	Allotted Hours	Marks Allotted	To be covered in
1.	English Literacy	20 hrs.	9	Block – I
2.	I.T. Literacy	20 hrs.	9	
3.	Communication Skills	15 hrs.	7	
4.	SUB TOTAL:	55	25	
5.	Entrepreneurship Skills	15 hrs.	6	
6.	Productivity	10 hrs.	5	
7.	Occupational safety , health and Environment Education	15 hrs.	6	
8.	Labour Welfare Legislation	05 hrs.	3	
9.	Quality Tools	10 hrs.	5	
	Sub Total:	55	25	
	TOTAL	110 hrs.	50	

Detail of Syllabus

1. English Literacy	
Hours of Instruction: 20 Hrs. Marks Allotted: 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	
Hours of Instruction: 20 Hrs. Marks Allotted: 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 Hour of Instruction: 15 Hrs. Marks Allotted: 07	
Topic	Contents
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
4. Entrepreneurship Skills Hour of Instruction: 15 Hrs. Marks	
Allotted: 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	
Hour of Instruction: 10 Hrs. Marks Allotted: 05	

Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard. Industry Nation.
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.
7. Occupational Safety, Health and Environment Education Hour of	
Instruction: 15 Hrs. Marks Allotted: 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 of 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 Hour of Instruction: 05 Hrs.	
Marks Allotted: 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.
Hour of Instruction: 10 Hrs.	
8. Quality Tools	Marks Allotted: 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

Tools & Equipments for Employability Skills:

Sl. No.	Name of the Equipment	Quantity
1	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 nos.
2	UPS - 500Va	10 nos.
3	Scanner cum Printer	1 no.
4	Computer Tables	10 nos.
5	Computer Chairs	20 nos.
6	LCD Projector	1 no.
7	White Board 1200mm x 900mm	1 no.

* Note: Above Tools & Equipments not required, if Computer LAB is available in the institute.

Syllabus for

ENGINEERING DRAWING

GENERAL INFORMATION
(Engineering Drawing)

1. **Name of the Subject :** ENGINEERING DRAWING
2. **Hours of Instruction:** 310 hrs.
3. **Instructor Qualification:** Degree in Engineering with one year experience
OR
Diploma in Engineering with two years experience
OR
NCVT / NAC in the Draughtsman (Mechanical / Civil)
with three years experience.
4. **Desirable:** Craft Instructor Certificate in RoD & A course under NCVT.
5. **Instructor:**
 - One full time instructor is required for 144Engineering seats sanctioned in the institute. Additional instructor will be required on increase in every 144 students.
 - For seats less than 144, the instructor may be out sourced/ hired on contract basis.

Details of syllabus

Sl. No.	Topics (Total duration – 310 hrs.)
1.	Engineering Drawing: Introduction and its importance <ul style="list-style-type: none"> - Relationship to other technical drawing types - Conventions - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2.	Drawing Instruments : their Standard and uses <ul style="list-style-type: none"> - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
3.	Lines : <ul style="list-style-type: none"> - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment
4.	Drawing of Geometrical Figures: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. <ul style="list-style-type: none"> - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.
5.	Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6.	Dimensioning: <ul style="list-style-type: none"> - Definition, types and methods of dimensioning (functional, nonfunctional and auxiliary) - Types of arrowhead - Leader Line with text
7.	Free hand drawing of <ul style="list-style-type: none"> - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches.
8.	Sizes and Layout of Drawing Sheets <ul style="list-style-type: none"> - Basic principle of Sheet Size - Designation of sizes - Selection of sizes - Title Block, its position and content - Borders and Frames (Orientation marks and graduations) - Grid Reference - Item Reference on Drawing Sheet (Item List)
9.	Method of presentation of Engineering Drawing <ul style="list-style-type: none"> - Pictorial View - Orthogonal View - Isometric view
10.	Symbolic Representation (as per BIS SP:46-2003) of : Fastener (Rivets, Bolts and Nuts) - Bars and profile sections <ul style="list-style-type: none"> - Weld, brazed and soldered joints.

	- Electrical and electronics element - Piping joints and fittings
11.	Construction of Scales and diagonal scale
12.	Practice of Lettering and Title Block
13.	Dimensioning practice: - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance. - Text of dimension of repeated features, equidistance elements, circumferential objects.
14.	Construction of Geometrical Drawing Figures: - Different Polygons and their values of included angles. Inscribed and Circumscribed polygons. - Conic Sections (Ellipse & Parabola)
15.	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.
16.	Free Hand sketch of hand tools and measuring tools used in respective trades.
17.	Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1 st angle and 3 rd angle projection as per IS specification.
18.	Drawing of Orthographic projection from isometric/3D view of blocks
19.	Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
20.	Drawing details of two simple mating blocks and assembled view.
21.	- Machined components; concept of fillet & chamfer; surface finish symbols.
22.	- Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS.
23.	- Free hand Sketches for bolts, nuts, screws and other screwed members.
24.	- Free hand Sketching of foundation bolts and types of washers.
25.	- Standard rivet forms as per BIS (Six types).
26.	- Riveted joints-Butt & Lap (Drawing one for each type).
27.	- Orthogonal views of keys of different types
28.	- Free hand Sketches for simple pipe, unions with simple pipe line drawings.
29.	- Concept of preparation of assembly drawing and detailing. Preparation of simple assemblies & their details of trade related tools/job/exercises with the dimensions from the given sample or models.
30.	-Free hand sketch of trade related components / parts (viz., single tool post for the lathe, etc.)
31.	- Study of assembled views of Vee-blocks with clamps.
32.	- Study of assembled views of shaft and pulley.
33.	- Study of assembled views of bush bearing.
34.	- Study of assembled views of a simple coupling.
35.	- Free hand Sketching of different gear wheels and nomenclature.
36.	- Free hand Details and assembly of simple bench vice.
37.	- Reading of drawing. Simple exercises related to missing lines, dimensions. How to make queries.
38.	- Simple exercises relating missing symbols. - Missing views

39.	- Simple exercises related to missing section.
40.	-Free hand sketching of different types of bearings and its conventional representation.
41.	- Free hand sketching of different gear wheels and nomenclature/ Simple duct (for RAC). Free hand sketch of Reciprocating compressor - open type (for RAC)
42.	- Solution of NCVT test. - Simple exercises related to trade related symbols. - Basic electrical and electronic symbols
43.	- Study of drawing & Estimation of materials.
44.	- Solution of NCVT test papers.
45.	Revision
46.	Examination

LIST OF TOOLS & EQUIPMENTS

Sl. No.	NAME OF TOOLS / EQUIPMENTS	QUANTITY
1.	Drawing Board	20
2.	Models : Solid & cut section	as required
3.	Table for trainees	20
4.	Stool for trainees	20
5.	Cupboard (big)	01
6.	White Board (size: 8ft. x 4ft.)	01
7.	Trainer's Table	01
8.	Trainer's Chair	01

Syllabus for

Workshop Calculation & Science

GENERAL INFORMATION
(Workshop Calculation & Science)

1. **Name of the subject :** WORKSHOP CALCULATION & SCIENCE
2. **Hours of Instruction:** 220 hrs.
3. **Examination:** The examination for the subject will be held at the end of training.
4. **Instructor Qualification:** Degree in Engineering with two years experience OR
Diploma in Engineering with one year experience
5. **Desirable:** Craft Instructor Certificate in RoD & A course under NCVT.
6. **Instructor:**

One full time instructor is required for 144Engineering seats sanctioned in the institute. Additional instructor will be required on increase in every 144 students.

For seats less than 144, the instructor may be out sourced/ hired on contract basis.

SYLLABUS FOR WORKSHOP CALCULATION AND SCIENCE
(Total duration – 220 hrs.)

Topic No	Workshop Calculation	Workshop Science
1.	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Material Science : 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 metals, Non-Ferrous Alloys.
2.	Fractions : Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Mass .Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.
3.	Square Root: Square and Square Root, method of finding out square roots, Simple problem using calculator.	Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.
4.	Ratio & Proportion : Simple calculation on related problems.	Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines,
5.	Percentage : Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.
6.	Algebra : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Heat & Temperature: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.
7.	Mensuration : Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids - cube, cuboid, cylinder and Sphere. Surface area of solids -cube, cuboid, cylinder and Sphere.	Basic Electricity: Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections - series, parallel, electric power, Horse power, energy, unit of electrical energy.
8.	Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables	Levers and Simple Machines: levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.
9.	- Geometrical construction & theorem: division of line segment, parallel lines, similar angles, perpendicular lines, isosceles triangle and right	- Forces definition. - Compressive, tensile, shear forces and simple problems.

	angled triangle.	-Stress, strain, ultimate strength, factor of safety. -Basic study of stress-strain curve for MS.
10.	- Area of cut-out regular surfaces: circle and segment and sector of circle.	- Temperature measuring instruments. Specific heats of solids & liquids.
11.	- Area of irregular surfaces. - Application related to shop problems.	- Thermal Conductivity, Heat loss and heat gain.
12.	- Volume of cut-out solids: hollow cylinders, frustum of cone, block section. - Volume of simple machine blocks.	- Average Velocity, Acceleration & Retardation. - Related problems.
13.	- Material weight and cost problems related to trade.	- Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force
14.	- Finding the value of unknown sides and angles of a triangle by Trigonometrical method.	
15.	- Finding height and distance by trigonometry.	
16.	- Application of trigonometry in shop problems. (viz. taper angle calculation).	
17.	Graph: - Read images, graphs, diagrams - bar chart, pie chart. - Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.	- Friction- co-efficient of friction, application and effects of friction in Workshop practice. Centre of gravity and its practical application.
18.	Simple problem on Statistics: - Frequency distribution table - Calculation of Mean value. - Examples on mass scale productions. - Cumulative frequency -Arithmetic mean	- Magnetic substances- natural and artificial magnets. - Method of magnetization. Use of magnets.
19.	Acceptance of lot by sampling method (within specified limit size) with simple examples (not more than 20 samples).	- Electrical insulating materials. - Basic concept of earthing.
20.		- Transmission of power by belt, pulleys & gear drive. - Calculation of Transmission of power by belt pulley and gear drive.
21.		- Heat treatment and advantages.
22.		Concept of pressure - units of pressure, atmospheric pressure, absolute pressure, gauge pressure -gauges used for measuring pressure
23.		Introduction to pneumatics & hydraulics systems.

BLOCK – II

DURATION: 09 MONTHS (39 weeks)

Industry level training

BROAD LEARNING TO BE COVERED IN INDUSTRY FOR FITTER TRADE:

- 1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)**
- 2. Record keeping and documentation**
- 3. Basic machining operations**
- 4. Preparing components**
- 5. Assembling**
- 6. Repair & Maintenance work**
- 7. Inspection & testing**

DETAILS OF PRACTICAL SKILLS TO BE COVERED DURING INDUSTRY TRAINING FOR FITTER TRADE

Duration of training: - 09 Months

Actual training will depend on the existing facilities available in the establishments.

The candidate should be competent to execute following operation/ skills after completion of the industrial training: -

- 1) Handle Fire extinguishers of different types, refill extinguishers and usage of PPE.
- 2) Prepare different types of documentation as per industrial need by different methods of recording information.
- 3) Produce components by drilling (through and blind holes at an angle) & reaming to accuracy for fitting male and female parts and grinding of drill bit.
- 4) Assemble part by riveting, screwing, pinning and welding so as to make complete unit according to drawing using different power tools.
- 5) File & fit different mating surface (internal & external) within an accuracy of ± 0.02 mm & 15 minutes in case of angular fitting. Check adherence to specification and quality standards using equipments like Vernier calipers, micrometers etc.
- 6) Make slide fitting, Diamond fitting, Scrape (internal & external) angular mating surfaces, lapping of flat and cylindrical surfaces using lapping plate.
- 7) Checking geometrical parameters with sine bar and slip gauges/CMM/Profile projector, etc. and usage of simple limit gauges and templates.
- 8) Handles simple jigs and fixtures and make simple drilling jigs.
- 9) Assemble components using dovetail fitting, dowel pins, screws and sliding components using keys, cotter jib, guide pin, etc. with ± 0.02 mm accuracy.

- 10) Dismounting & mounting pulleys, belts, sprockets, bearing & gears on shaft and minor repair of damage keys and gears used in power transmission system in machine tools.
- 11) Thread standard pipes, join pipes, make pipe assembly and Dismantle & assemble – globe valves sluice valves, stop cocks, seat valves and non-return valve and testing for leakage.
- 12) Dismantle, minor repair work & assemble simple machine tools viz., Drill Machine, Lathe, Grinding and Power saw machine etc. and Inspection and accuracy of Machine tools.
- 13) Erect and align simple machines.
- 14) Familiarization with pumps, air compressor, pneumatic tools and hydraulic driver machines.

NOTE: -

1. In addition to the above mentioned skills/ operations industry may impart training on any other skills/ operations related to the trade.
2. All the operations/ skills indicated above related to milling machine may be executed both in conventional and CNC machine.
3. Utility jobs-such as actual machine parts-components, accessories etc. should be given to trainees for machining
4. Assignment should be planned so that the trainees may spend 20% of the total time of production type of work (using gauges, templates, fixture etc.) for developing their skill and confidence about manufacturing which will help ever in self- employment, if found necessary in the future.

BLOCK – III

DURATION: 3 months (13 weeks)

Institute level training

For last three months candidates will be engaged in following works: -

1. Revision of theoretical components covered during Block – I.
2. Practical practice and report submission
3. Preparing candidate to face interview, preparation of bio-data, awareness about different jobs in the related field and grooming to be an entrepreneur.
4. Self study and final AITT examination

Note:-

1. The training may be conducted in Block mode i.e. few months in ITI & few in Industry.
2. The training may be conducted in flexible mode i.e. few days of a week in ITI & few days in Industry.
3. Nine months industrial training is mandatory.
4. Last three months of training in ITI is mandatory.
5. No admission of trainees without signing MOU with industry by the Institute (ITI).
6. To sign MOU with ITI, industry must ensure the training facility should be available to impart different skill sets as indicated in Block-II. At least 60% of total skill set in Block-II for Fitter and 75% of total skill set in Block-II for Turner, Machinist & TDM(Dies & Moulds) to be covered in industry.
7. If the industry ensures delivery of skill training as per Sl. 6 then 2nd MOU is not necessary.
8. However, Industry should ensure 100% skill training indicated in Block-II & necessary arrangement to be made to cover training on rest skill set (beyond the % indicated in sl.6) in collaboration with any other related industries. Extensive use of E-learning process may also be adopted.

TRADE: FITTER (Dual mode)

LIST OF TOOLS & EQUIPMENTS FOR 16 TRAINEES

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity
1	Steel Rule 15 cm with metric graduation	16 nos.
2	Try Square 10 cm blade.	16 nos.
3	Caliper inside 15 cm spring.	16 nos.
4	Caliper 15 cm hermaphrodite	16 nos.
5	Caliper outside 15 cm spring	16 nos.
6	Divider 15 cm spring	16 nos.
7	Straight Scriber 15 cm.	16 nos.
8	Centre Punch 10 cm	16 nos.
9	Screw driver 15 cm	16 nos.
10	Chisel cold flat 10 cm	16 nos.
11	Hammer ball peen 0.45 kg. With handle	16 nos.
12	Hammer ball peen 0.22 kg. With handle.	16 nos.
13	File flat 25 cm. second cut	16 nos.
14	File flat 25 cm. smooth	16 nos.
15	File half round second cut 15 cm.	16 nos.
16	Hacksaw frame fixed 30 cm.	16 nos.
17	Safety goggles.	16 nos.
18	Dot slot punch 10 cm.	16 nos.

B : Instruments & General Shop Outfit

Sl. No.	Name of the items	Quantity
19	Steel Rule 30 cm	4 nos.
20	Steel Rule 60 cm.	4 nos.
21	Straight edge 45 cm steel	2 nos.
22	Surface plate 45 x 45 cm CI/ Granite.	2 nos.
23	Marking table 91 x 91 x 122 cm.	1 no.
24	Universal scribing block 22 cm.	2 nos.
25	V-Block pair 7 cm and 15 cm with clamps	2 nos.
26	Square adjustable 15 cm blade.	2 nos.
27	Angle plate 10 x 20 cm.	2 nos.
28	Spirit Level 15 cm metal	1 no.
29	Punch letter 3 mm set.	1 no.
30	Punch number set 3 mm.	1 no.
31	Punch hollow 6 mm to 19 set of 5	2 nos.
32	Punch round 3mm x 4 mm set of 2	2 nos.
33	Portable hand drill (Electric) 0 to 6 mm	2 nos.
34	Drill twist straight shank 1.5 to 12 mm by 0.5 mm	1 Set
35	Drill twist straight shank 8 mm to 15 mm by ½ mm	1 Set
36	Taps and dies complete set in box B.A	1 no.
37	Taps and dies complete set in box with-worth.	1 no.
38	Taps and dies complete set in box 3-18 mm set of 10	1 no.
39	File warding 15 cm smooth	4 nos.
40	File knife edge 15 cm smooth	4 nos.
41	File cut saw 15 cm smooth	4 nos.
42	File feather edge 15 cm smooth	4 nos.
43	File triangular 15 cm smooth	2 nos.
44	File round 20 cm second cut	8 nos.
45	File square 15 cm second cut	4 nos.
46	File square 25 cm second cut	4 nos.
47	Feeler gauge 10 blades	1 set
48	File triangular 20 cm second cut.	8 nos.
49	File flat 30 cm second cut.	8 nos.
50	File flat 20 cm bastard	8 nos.
51	File flat 30 cm bastard.	8 nos.
52	File Swiss type needle set of 12.	2 sets
53	File half round 25 cm second cut.	8 nos.
54	File half round 25 cm bastard.	4 nos.
55	File round 30 cm bastard.	4 nos.
56	File hand 15 cm second cut.	8 nos.
57	Card file.	8 nos.
58	Oil Stone 15 cm x 5 cm x 2.5 cm	4 nos.

59	Stone carborandum 15 cm x 5 cm x 5 cm x 4 cm.	2 nos.
60	Oil Can 0.25 liters.	2 nos.
61	Pliers combination 15 cm	2 nos.
62	Soldering Iron 350 gm.	2 nos.
63	Blow Lamp 0.50 liters.	2 nos.
64	Spanner D.E. 6 -26 mm set of 10 pcs.	8 nos.
65	Spanner adjustable 15 cm	2 nos.
66	Interchangeable ratchet socket set with a 12 mm driver, sized 10-32 mm set of 18 socket & attachments.	1 set
67	Box spanner set 6-25 mm set of 8 with Tommy bar.	1 set
68	Glass magnifying 7 cm	2 nos.
69	Clamp toolmaker 5 cm and 7.5 cm set of 2.	2 nos.
70	Clamp "C" 5 cm	2 nos.
71	Clamp "C" 10 cm	2 nos.
72	Hand Reamer adjustable cover max 9 ,12,18mm – set of 3	1 set
73	Hand Reamer taper 4 -9mm set of 6 OR 4 -7 mm set of 4.	1 set
74	Reamer parallel 12 - 16mm set of 5.	1 no.
75	Scraper flat 15 cm.	8 nos.
76	Scraper triangular 15 cm	8 nos.
77	Scraper half round 15cm	8 nos.
78	Chisel cold 9 mm cross cut 9 mm diamond.	8 each
79	Chisel cold 19 mm flat	8 nos.
80	Chisel cold 9 mm round noze.	8 nos.
81	Stud Extractor EZY – out	2 nos.
82	Combination Set 30 cm.	2 nos.
83	Micrometer 0 – 25 mm outside.	2 nos.
84	Micrometer 25 – 50 mm outside.	3 nos.
85	Micrometer 50 –75 mm outside.	2 nos.
86	Micrometer inside 25 - 50 mm with extension rods.	1 no.
87	Vernier caliper 15 cm	1 no.
88	Vernier height gauges 30 cm.	1 no.
89	Vernier bevel protractor.	1 no.
90	Screw pitch gauge.	1 no.
91	Wire gauge, metric standard.	1 no.
92	Drill twist Taper Shank 12 mm to 25 mm x 1.5.	1 no.
93	Drill chuck 12 mm.	1 no.
94	Pipe wrench 40 cm	1 no.
95	Pipe vice 100mm	1 no.
96	Adjustable pipe tap set BSP with die set cover pipe size 15, 20, 25,32,38,50 mm.	1 no.
97	Wheel dresser (One for 4 units).	1 no.
98	Machine vice 10 cm.	1 no.
99	Machine vice 15 cm	1 no.

100	Sleeve drill Morse 0 - 1, 1 - 2, 2 - 3.	1 Set
101	Vice bench 12 cm jaws.	16 nos.
102	Vice leg 10 cm jaw.	2 nos.
103	Bench working 240 x 120 x 90 cm.	4 nos.
104	Almirah 180 x 90 x 45 cm.	2 nos.
105	Lockers with 6 drawers (standard size).	2 nos.
106	Metal rack 182 x 182 x 45 cm	1 no.
107	Instructor Table	1 no.
108	Instructor Chair	1 no.
109	Black board with easel.	1 no.
110	Fire extinguisher (For 4 Units)	2 nos.
111	Fire buckets.	2 nos.
112	Machine vice 100mm.	2 nos.
113	Wing compass 25.4 cm or 30 cm.	2 nos.
114	Hand hammer 1 kg. with handle.	2 nos.
115	Torque wrench (14 to 68 Nm)	1 no.

C : Tools for Allied Trade- Blacksmith & Sheet Metal Work

Sl. No.	Name of the items	Quantity
115	Hammer smith 2 kg. With handle.	2 nos.
116	Tongs roving 350mm.	2 nos.
117	Tongs fiat 350mm.	2 nos.
118	Smith's square 45 cm x 30 cm.	1 no.
119	Cold set rodded 25X200mm.	2 nos.
120	Hot set rodded 25X200mm.	1 no.
121	Swages top & bottom 12 mm /19	1 Each
122	Swage block 35 x 35 x 12 cm.	1 no.
123	Flatters (rodded) 55 mm square.	2 nos.
124	Fuller top & bottom 6 mm 9 mm (Pair).	2 nos.
125	Anvil 50 kg.	2 nos.
126	Anvil stand	2 nos.
127	Shovel.	2 nos.
128	Trammel 30cm.	1 no.
129	Rake.	2 nos.

130	Quenching tank (To be made in the Institute).	1 no.
131	Pocker.	2 nos.
132	Hardle.	2 nos.
133	Leather apron.	2 nos.
134	Prick punch	2 nos.
135	Mallet.	2 nos.
136	Snips straight 25 cm.	2 nos.
137	Setting hammers with handle.	2 nos.
138	Planishing hammer.	2 nos.
139	Snip bent 25 cm.	2 nos.
140	Stake hatchet.	2 nos.
141	Stake grooving.	2 nos.
142	Gauge imperial sheet.	1 no.

The specifications of the items in the above list have been given in Metric Units. The items which are available in the market nearest of the specification as mentioned above, if not available as prescribed should be procured Measuring instruments such as steel rule which are graduated both English and Metric Units may be procured, if available.

D : Modified list of tools for the 3rd and 4th semester for fitter trade.

Sl. No.	Name of the Tools & Equipment	Quantity
*1.	Slip Gauge as Johnson metric set.	1 Set
2.	Carbide Wear Block 1 mm – 2 mm.	2 each
*3.	Gauge snap Go and Not Go 25 to 50 mm by 5mm. Set of 6 pcs.	1 Set
*4.	Gauge plug single 3 ended 5 to 55 by 5 mm. Set of 11 pcs.	1 Set
**5.	Gauge telescopic upto 150 mm.	1 no.
6.	Dial test indicator .01 mm on stand	1 no.
7.	Sine bar 125 mm.	1 no.
8.	Sine bar 250 mm.	1 no.
9.	Lathe tools H.S.S. tipped set.	2 nos.
10.	Lathe tools bit 6 mm x 75 mm.	4 nos.
11.	Lathe tools bit 8 mm x 75 mm.	4 nos.
12.	Lathe tools bit 10 mm x 85mm.	4 nos.
13.	Arm strong type tool bit holder R.H.	2 nos.
14.	Arm strong type tool bit holder L.H.	2 nos.
15.	Arm strong type tool bit holder straight.	2 nos.
16.	Stilson wrenches 25 cm	2 nos.
17.	Pipe cutter 6 mm to 50 mm wheel type.	1 no.

18.	Pipe bender spool type up to 25 mm. with stand manually operated.	1 no.
19.	Adjustable pipe chain tonge to take pipes up to 300 mm.	1 no.
20.	Adjustable spanner 38 cm long.	1 no.
**21.	Dial vernier caliper 0 – 200 mm LCO 0.05 mm. (Universal type).	1 no.
**22.	Screw thread micrometer with interchangeable 0-25mm. Pitch anvils for checking metric threads 60.	1 no.
23.	Depth micrometer 0-25 mm. 0.01 mm.	1 no.
**24.	Vernier caliper 0-150 mm. L.C. 0.02 mm.	1 no.
**25.	Digital Micrometer 0 – 25 mm outside. L.C. 0.001 mm.	1 no.
**26.	Comparators stand with dial indicator LC 0.01mm.	1 no.
27.	Engineer's try square (knife-edge) 150 mm blade.	1 no.
**28	Surface roughness comparison plates N1-N12 grade	1 Set
29	Digital Vernier caliper 0-150 mm. L.C. 0.001 mm.(Optional)	1no.

E : General Machinery Installations –

Sl. No.	Name & Description of Machines	Quantity
*1.	SS and SC centre lathe (all geared) with specification as: Centre height 150 mm and centre distance 1000 mm along with 4 jaw chuck, auto feed system, safety guard, motorized coolant system and with lighting arrangement.	2 Nos.
2	Drilling machine pillar sensitive 0-20 mm cap with swivel table motorised with chuck & key.	1 no.
3	Drilling machine bench sensitive 0-12 mm cap motorised with chuck and key.	2 nos.
4	Forge portable hand blower 38 cm to 45 cm.	1 no.
5	D.E. pedestal Grinding machine with 200mm diameter wheels rough and smooth with twist drill grinding attachment.	1 no.

Note: - (*) No additional number of items are required to be provided up to four batches of trainees i.e. two batches in the first shift and two in the second shift.

(**) Only one number need be provided in each I.T.I. irrespective of No. of Units.

F : List of additional tools for allied trade in welding

Sl. No.	Name & Description of Machines	Quantity
1.	Transformer welding set 150 amps. – continuous welding current, with all accessories and electrode holder	1 Set
2.	Welder cable to carry 200 amps. With flexible rubber cover	20 Meter
3.	Lungs for cable	12 Nos.
4.	Earth clamps.	2 Nos.
5.	Arc welding table (all metal top) 122 cm X 12 cm X 60 cm	1 No.

	with positioner.	
6.	Oxy – acetylene gas welding set equipment with hoses, regulator and other accessories.	1 Set.
7.	Gas welding table with positioner	1 No
8.	Welding torch tips of different sizes	1 Set
9.	Gas lighter.	2 Nos
10.	Trolley for gas cylinders.	1 No
11.	Chipping hammer.	2 Nos
12.	Gloves (Leather)	2 Pairs
13.	Leather apron.	2 Nos
14.	Spindle key for cylinder valve.	2 Nos.
15.	Welding torches 5 to 10 nozzles.	1 Set.
16.	Welding goggles	4 Pairs.
17.	Welding helmet with coloured glass	2 Nos.
18.	Tip cleaner	10 Sets.

Note: - Those additional items are to be provided for the Allied Trade Training where the welding trade does not exist.

ALLOTMENT OF TIME & MARKS AMONG
THE SUBJECTS FOR EXAMINATION

Sl. No.	SUBJECTS	Duration of exam (in Hrs.)	Full Marks	Pass Marks
1.	Trade Theory + E/S (150+50)	3	200	80
2.	Workshop Cal. & Sc.	3	50	20
3.	Engineering Drawing	4	50	20
4.	Internal Marks (ITI)	--	50	30
5.	Trade Practical –I*	4	50	30
6.	Internal Marks (Industry)	--	50	30
7.	Trade Practical-II** + Project work (200+50)	8	250	150
GRAND TOTAL			700	360

Note:-

1. “*” represents practical conducted at ITI
2. “**” represents practical conducted at Industry at the end of training
3. 40% pass marks for theory subjects and 60% pass marks for practical
4. The project work will be conducted at industry and industry will allot marks for the same.

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 :			Block:			Duration of the Trade/course:								
Operation/Skill:														
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														

LIST OF TRADE COMMITTEE MEMBERS

Sl. No.	Name & Designation	Organization
1.	Smt Sandhya Salwan, Director of Training	DGT, MSDE
2.	Shri.A.Mahendiran, Director	FTI Bangalore
3.	Shri.Satya Shankar.BP, Director	APEX-Hi-Tech, Bangalore
4.	Shri N.K Thakur, DGM	L&T Chennai.
5.	Shri Rajeev Khurana, GM	Maruti Suzuki India Ltd Gurgoan.
6.	Shri. Nirmalya Nath, ADT	CSTARI Kolkata.
7.	Shri P. MOULI, ADT	DGT Delhi.
8.	Shri R N Manna, TO	CSTARI Kolkata.
9.	Shri Anil. V. Bhide, Manager	NTTF, Bangalore
10.	Shri Kashinath. P, Director (Training), Bangalore	ACE Designers,
11.	Shri Shankara H. S.	BFW, Bangalore
12.	Shri C. Sekharan, Retd. AGM	HMT, Bangalore
13.	Shri Hemant D. Ganjare, DDT	APEX-Hi-Tech, Bangalore