SYLLABUS FOR

INDUSTRIAL FITTER

UNDER CODE OF REGULATIONS FOR INDUSTRIAL SCHOOLS

AS APPROOVED BY
DEPARTMENT OF EMPLOYMENT AND TRAINING, CHEPAUK,
CHENNAI – 600 005.

.....2005

LIST OF COMMITTEE MEMBERS

FOR THE TRADE OF *INDUSTRIAL FITTER*

MEMBERS AND EXPERTS

1. THIRU. S.SUBBIAH M.E.
   RJD COIMBATORE REGIN.

2. THIRU. C. RAVICHANDIRAN B.E., M.B.A.
   PRINCIPAL, GOVT. ITI, HOSUR

3. THIRU. S. MANI B.E.
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   A.T.O., GOVT ITI, HOSUR

5. THIRU. R.G.BALASUBRAMANI
   J.T.O., GOVT. ITI, HOSUR

Name of the trade	: **INDUSTRIAL FITTER**
Qualification	: **10 th pass/fail**
Duration	: **Two year**
Number of trainees	: **20**
No. of practical hours	: **32 Hours per week**
No. of theory hours	: **8 Hours per week** (Workshop Cal – 2 hrs ED – 2 hrs)

Space required

1. Work Shop	: **600 Sq.ft (56.92 Sq.m.)**
2. Class Room	: **300 Sq.ft (28.46 Sq.m.)**

Power required (in **KW**) : **8 KW**

SYLLABUS FOR INDUSTRIAL FITTER

WEEKWISE PRACTICAL SYLLABUS

WEEK NO:	SYLLABUS
1.	Familiarisation with the Institute Importance of trade training, Machinery used in the trade, types of work done by trainees in the trade, introduction of safety equipment and their uses.
2.	Marking out lines gripping suitably in vice jaws, hack sawing to given dimensions sawing different type of metals of different sections.
3.	Filing Channel Parallel Filing Flat and Square (Rough finish).
4.	Filing practice, surface filing marking off straight and parallel line with old leg calipers and steel rule, marking practice with dividers old leg calipers and steel rule (circles, arcs, parallel lines).
5.	Marking off straight lines and arcs using dividers chipping flat surface along a marked line.
6.	Marking, filing, filing square, use of tri-square.
7&8.	Marking according to simple blue prints location position of hole scribing lines on chalked surfaces with making tools finding centre of round bar with the help of V' block and marking block. Joining setline to an arc.
9.	Chipping Chip slots & oils grooves (Straight).
10.	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.
11.	File thin metal to an accuracy of 0.5mm chip chamfer, grooves and slots.
12.	Saw along a straight line, curved line, on different sections of metal. Straight saw on thick section. M.S. angle and pipes.
13.	File steps and finish with smooth file accuracy ±0.25 mm. File and saw on M.S. Square and pipe weds. Industrial Visit
14.	File radius along a marked line (Convex & Concave) & match. Chip step and file.
15.	Punch letter and number (letter and number punch) use of different punches.
16.	Stepped keyed fitting–test job Lapping holes and cylindrical surfaces.
17.	Make snap gauge+/0.02mm.
18.	Practice in dovetail fitting assembly and dowel pins and cap screws assembly.
19.	Preparation of gap gauges.
20.	Dovetail and Dowel pin assembly
21.	Preparation of centre squares, drill gauges.
22.	File and fit straight and angular surfaces internally.

23. Step fitting.

24. Angular fitting.

25. Simple open and sliding fits

26. Cutting & threading of pipe length-fitting of pipes as per sketch.

27. Sliding fitting

28. Mark off and drill through holes-drill on M.S. flat.

29. File and fit combined radius fitting

30. Angular fitting (accuracy ±.5mm)

31. Angular and radius fit .

32. Locate accurate hole.

33. Make accurate hole for stud fit.

34. Prepare forge. Fire for heating metals. Forge a square rod from round stock.

35. Forge M.S. bar to square Octagon and hexagon.

36. Forge flat chisel grind and heat treat chisels.

37. Marking of straight lines, circles, profiles and various geometrical shapes and cutting the sheets with snips.

38. Make various joints, wiring hemming, form locked grooved and knocked up joints, single hem straight and curved edges form double hemming.

39. Bend sheet metal into various curvature. Fold sheet metal at an angle using stakes. Bend sheet metal to various curvature.

40. Make square tray and funnel as per development.

41. Striking and maintaining arc, straight line head.

42. Make square butt joint and 'T ' fillet joint-gas and arc.

43. Make butt weld and corner fillet welding Gas and Arc.

44. Do gas cutting.

45. True job on four jaw chuck using knife tool .

46. face both the ends for holding between centers. Measure the diameter using outside caliper
and steel rule.

47. Tool grinding, plain turning, step turning.

48. Holding the job in three jaw chuck-, Chamfer-corner round the ends.

49. Shoulder turn : square filleted beveled under cut shoulders.

50. Cut grooves- square, round, 'V' groove.

51. Make a mandrel -turn diameter to sizes knurl the job.

52. Bore holes-spot face, pilot drill, enlarge hole, using boring tools make a bush.

53. Step bore-cut recess turn hole diameter to sizes.

54. Turn taper (internal and external).Turn taper pins.

55. Turn standard tapers to suit with gauge.

56. Introduction to milling machine, demonstration on working principle.

57. Setting of job, setting of cutter in arbor, setting of vice on table.

58. –do-

59. Step milling using side and face cutter – checking with micrometer.

60. –do-

61. Sequence of milling six faces of a solid block checking the accuracy.

62. –do-

63. With the help of tri-square scribing block and vernier height gauge.

64. Straddle and gang milling operations including.

65. Up-milling and down milling.

66. –do-

67. Milling concave and convex surfaces.

68. Grinding -surface &circular.

69. Cut threads using taps & dies by hand.

70. Prepare a nut and match with the bolt.

71. Simple repair of machinery -making of packing gaskets-use of hollow punches, extractor -drafts- various types of hammers and spanners, etc.

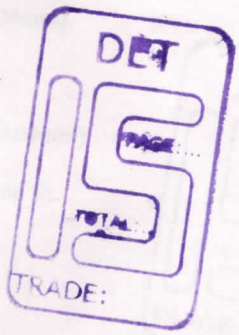
72. Make riveted joints (lap and butt joints).

73. Drilling for riveting. Riveting with as many types of rivet as available.

74. Use of countersunk head rivets -use of counterbore tools to fit cheese head bolts.

75. Filing of bearing to close precision

76. Enlarge hole and increase internal dia.



77. File cylindrical surfaces.

78. Inside square fitting.

79. Make combined open and straight sides 'T' fit.

80. File fit combined open angular and sliding sides.

81. Practice in handling fire extinguisher of different types-refilling of extinguishers.

82. Make sliding fit with angles other than 90° sliding fit with an angle .

83. Make simple bracket by bending and twisting nonferrous metal.

84. Drill small holes (2mm) Drill holes on sheet metal.

85. Form internal threads with taps to standard size (through holes and blind holes)-

86. Drill through hole and tap.

87. Drill blind hole and tap.

88. From external threads with dies to standard size.

89. Three piece fitting.

90. Make assembly for dovetail sliding fits using lower pins and screw (±0.04mm).

91. Cutting threads using dies.

92. Make sliding fits assembly with parallel and angular mating surface. (± 0.04mm)

93. Prepare triangle, hexagon on ends of a cylinder bar prepare female end and fit.

94. Make key and ways on the shaft.

95. Drill on cylindrical surface.

96. Make simple dowel pins-fitting dowel pins

97. Precision drilling, reaming and tapping.

98. Fitting of dovetail slides.

99. Complete exercises covering the assembly of parts working to details and arrangements drawings.

100. Dismantling and mounting of pulleys .making replacing damaged keys.

101. Revision

102. Test

103. Revision.

104. Test

SYLLABUS FOR INDUSTRIAL FITTER

WEEKWISE THEORY SYLLABUS

WEEK NO:	SYLLABUS
1.	Importance of safety and general precautions observed in the Institute and in the section.
2.	Importance of the trade development of Industrial economy of the country. What is the related instructions subjects to be taught achievement to made. Recreational, medical facilities and other extra curricular activities of the Institute.
3.	Safety accident preventions linear measurement its units dividers, calipers, hermaphrodite, centre punch, dot punch, their descriptions and uses of different types of harmers, descriptions, uses and care of V' Blocks, marking off table.
4.	Bench vice constructions, types, uses care & maintenance, vice clamps, hacksaw frames and blades specification description, types and their uses, method of using hacksaws.
5.	Files specifications, descriptions, material grades, cuts file elements uses, measuring standards (English Metric Units) angular measurements subdivisions, try square, ordinary depth gauge protector descriptions, use and care.
6.	Marking off and layout tools, divider, scribing block, old leg calipers, punches descriptions, classifications material care & maintenance.
7.	Caliper 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.
8.	Surface plate and auxiliary marking equipment, 'V' block, description types and uses, workshop surface plate their uses accuracy, care and maintenance.
9.	Types of files convexing, taper, needle care and maintenance of files, various types of keys, allowable clearances
10.	-do-
11.	Keys and key ways. Types and their uses construction (shape).
12.	Spring - material types and uses.
13.	Special files: types (Pillar, Dread nought, Barrow, Warding) description.
14.	Templates and gauges. Introduction, necessity types.
15.	Gauge: Introduction, necessity types-description and uses of gauge –types (feeler screw, pitch, radius, wire gauge) description and use.
16.	Slip gauge: Necessity of using classification accuracy set of blocks(Metric) Details of slip gauge. Metric sets 46:103:112. Building up of slip gauge and care and maintenance. Application of slip gauge for measuring, Sine bar- Principle, application & Specification.
17.	Limit gauge, snap gauge, plug gauge, description and use.
18.	Fits: Definition, types description of each with sketch.

19. Pipes and pipe fitting commonly used pipes. Pipe bending methods.

20. Use of bending methods. Use of bending fixture, pipe threads die and tap pipe- vices.

21. Use of tools such as pipe cutters, pipe wrenches, pipe dies, and tape, pipe bending machine etc.

22. Drill process: common type(bench type, pillar type, radial type), gang and multiple drilling machine.

23. Vernier calipers, principle, constructions, graduations, reading, use and care. Vernier bevel protractor, construction, graduations, reading, use and care, Dial Vernier Caliper.

24. Micrometer outside and inside principle constructional features, parts graduation reading, use and care. Micrometer depth gauge, parts, graduation, reading, use and care.

25. Vernier micrometer, material, parts graduation, use, care and maintenance.

26. Vernier height gauge: material construction, parts, graduations (English & Metric) uses, care and maintenance.

27. Dial test indicator, construction, parts material, graduation, Method of use. Care and maintenance.

28. Drill holding devices : material, construction and their uses.

29. Drill processes: Common type (bench type, pillar type), gang and multiple drilling machine.

30. 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.

31. Drill troubles: causes and remedy. Equality of lips, correct clearance, dead centre, length of lips. Drill kinds: fractions, metric, letters and numbers, grinding of drill.

32. Drilling Jig-construction features type and uses.

33. Fixtures-constructional features types and uses.

34. Safety precautions to be observed in a smith shop forge: Necessity, description uses, fuel used for heating, blowers descriptions and uses. Anvil and swage blocks Descriptions and uses Forging tools hammers band and sledge descriptions and uses. Chisels, set hammers, flatters, hardie, fuller swage & uses.

35. Measuring and checking tools steel rule, brass rule, calipers, "T" squares, description and uses. General idea about the main operations performed in a forging shop such as upsetting, drawing, twisting, bending, punching, drifting, welding.

36. Heat treatment--necessary various heat treatment methods such as normalising annealing, hardening and tempering. Power hammer construction features, method of operating and uses.

37. Safety precautions to be observed in a sheet metal workshop, sheet and sizes. Commercial sizes and various types of metal sheets and their uses as per ISI specifications.

38. 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, stakes-bench types, parts their uses. Soldering iron, types, specifications, uses. Trammel, descriptions, parts, uses. Hand grooves specifications and uses.

39. Solders-composition of various types of solders, and their heating media of soldering iron. Fluxes: types, selection and application joints wiring - various types of metal joints, their selection and application. Tolerance for various joints, their selection & application.

40. Rivets-Tin man's rivets, types, sizes, selection for various works. Riveting tools, dolls, snaps, descriptions and uses. Method of reverting shearing machine description, parts and uses.

41. 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.

42. Hand tools : Hammers, welding description, types and uses, Machines and accessories, welding transformer, welding generators ,description principle, method of operating.

43. H.P. welding equipment description, principle method of operating L.P. welding equipment, description, principle, method of operating types: Joints--Butt and fillet as per BIS specifications.

44. Oxygen cutting machine description, parts, uses, method of handling cutting torch-description, parts function and uses. Gases and gas cylinder-description. Kinds main difference and uses.

45. Safety 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.

46. Between centre works catch plate, dog, simple description of a facing and roughing tool and their applications.

47. 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

48. Chucks and chucking the independent four jaw chuck. Reversible features of jaws, the back plate, Mounting and dismounting chucks,

49. Method of holding drills in the tail stock, Boring tools and enlargement of holes.

50. General turning operations parallel or straight, turning. Stepped turning grooving, shape of tools for the above operations. Appropriate method of holding the tool on tool post or tool rest.

51. Knurling tools descriptions, grade, uses, speed and feed coolant for knurling.

52. Taper-definition use and method of expressing tapers. Standard tapers-taper calculations.

53. Screw thread definition-uses and application. Terminology of screw threads, square worm butters (non standard-screw thread).

54. Principle of cutting screw thread in centre lathe principle of shading the screw thread - use of centre gauge,

55. Setting tool for cutting internal and external thread cutting use of screw pitch gauge, checking the screw thread.

56. Milling machine - importance of milling machine.

57. Types and specification of milling machine, driving and feed mechanism of milling machine.

58. –do-

59. Classification & different types of milling cutters & their use. Parts or nomenclature.

60. –do-

61. Different milling operations plain-face, angular,

62. Form, slot , gang, straddle milling etc.

63. Up and down milling process.

64. Different types of milling attachments and their uses.

65. -do-

66. Gear introduction, use and type. Elements of a spur gear.

67. -do-

68. Grinding wheel: Abrasive, grade structure, bond, specification, use of mounting and dressing, Bench grinder parts and uses.

69. Method of using taps and calculating tap hole sizes. Tap wrench: material parts, types (solid & adjustable types) and their uses removal of broken tap, studs (tap stud extractor).

70. Dies: material, parts, types, method of using dies. Die stock: material, parts and uses.

71. Preventive maintenance objective and function PM. Section inspection. Visual and detailed lubrication survey system of symbol and colour coding.

72. Bolts and Nuts: Material type (Hexagonal and square head) and their uses.

73. Washers: Material, types (spring, tab, plain washer and fiber washer).

74. Dowel pins: material construction types accuracy and uses.

75. Screws: material, different types (inch & metric), uses.

76. Locking device: Nuts types (lock nut - castle nut, slotted nuts swam nut, grooved nut). Description and uses.

77. Bearing -introduction, classification (Journal and thrust-Description of each, ball bearing: single row, doublers row, Description of each, advantages of double row.

78. Roller and needle bearing: Types of roller bearing -description & use of each. Method of fitting ball and roller bearings.

79. Bearing metals-type, composition and uses lubricant purpose of using different types, description and uses of each type.

80. Synthetic materials for bearing: The plastic lamination and materials, their properties and uses in bearings such as phonolic, pejion polyimide (nylon).

81. Fire-precautions-causes and types of fires-precautions against out break of fire. Fire extinguishers-types and uses.

82. 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.

83. Power transmission elements the object of belts-their sizes and specifications,

84. Selection of the type of belts with the consideration of weather load and tension-methods of joining.

85. Chains, wires ropes and clutches for power trans-mission. Their types and brief description.

86. Vee belts and their advantages and disadvantages.

87. Power transmissions-coupling types-flange coup-ling Hooks coupling –universal coupling and their different uses.

88. Pulleys -types -solid, split and 'V' pulley -loose and fast pulleys –jockey pulley. Types of drives -open and cross belt drives .

89. Power transmission -by gears, most common forms spur gear, set names of some essential parts of the set -the pitch circles - diameter pitch -velocity ratio of a gear set .

90. Helical gear, herring bone gears, bevel gearing rack worm gearing. Repair to gear teeth by building up and dovetail methods.

91. Methods of fixing geared wheels for various pupose drives.General cause of the wear and their remedies method of fitting spiral gears -helical gears -bevel gears -worm and worm wheels in relation to required drive.

92. Care and maintenance of gears.

93. Clutch: Type positive clutch (straight tooth type, angular tooth type O) friction type (flat and conical type).

94. Tapers on keys and cotters permissible by various standards.

95. Lubrication and lubricants. How lubricants is done. A good lubricant,-viscosity of the lubricant. Main property of lubricant. How a film of oil is formed in journal bearing.

96. Methods of lubrications gravity feed, force (pressure) feed, splash lubrication.

97. Cutting lubricants and coolants: Soluble oil soaps suds paraffin soda water -common lubricating oils and their commercial names selection of lubricants.

98. Installation, maintenance and overhaul of machinery and engineering equipment and alignment of machines.

99. Foundation bolt: types (rag, Lewis cotter bolt) description of each erection tool, pulley block, crow bar, spirit level, plumb bob, wire rope, manila rope, wooden block.

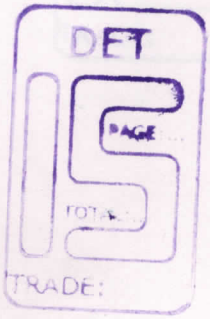
100. Foundation bolt: types (rag, Lewis cotter bolt) description of each erection tool, pulley block, crow bar, spirit level plumb bob, wire rope, manila rope, wooden block.

101. Revision

102. Test

103. Revision

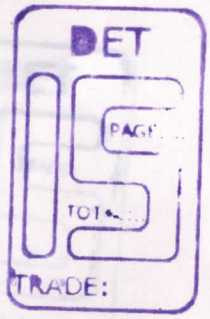
104. Test



SYLLABUS FOR: INDUSTRIAL FITTER

WEEKWISE ENGINEERING DRAWING SYLLABUS

WEEK NO:	SYLLABUS
1.	Introduction.
2.	Engineering Drawing :- Introduction to Engineering Drawing & its Importance.
3.	–do-
4.	Methods of dimensioning.
5.	Types of lines their meanings and application as per Is – 696.
6.	-do-
7.	Simple Conventional Symbols for materials and parts on per Is – 696.
8.	–do-
9.	User of drawing instruments in the construction of Geometrical drawing angle and Triangles.
10.	-do-
11.	Lettering number and alphabets vertical type.
12.	Lettering number and alphabet Inclined type.
13.	Ex. in plane fig like Triangle Quadrilateral, Polygons and cimler.
14.	–do-
15.	–do-
16.	–do-
17.	Ex. In machining symbol and surface finish.
18.	–do-
19.	Abbreviations used in Engineering Drawing.
20.	–do-
21.	Explanations of pictorial drawing isometric drawing of simple Geometrical solids.
22.	–do-
23.	–do-



24. Isometric views from simple solids like care, Rectangle, cylinder and cone.

25. –do-

26. –do-

27. –do-

28. Explenation of orthographic projection in III rd Angle Method. With example.

29. –do-

30. –do-

31. –do-

32. –do-

33. Explanation of orthographic projection in I st Angle Method. With example.

34. –do-

35. –do-

36. –do-

37. –do-

38. Isometric projection to orthographic projection from simple machine Blocks. In III rd Angle Method.

39. –do-

40. –do-

41. –do-

42. –do-

43. –do-

44. –do-

45. –do-

46. –do-

47. –do-

48. –do-

49. –do-

50. –do-

51. –do-

52. Test / Revision of I st Year.

53. Isometric projects to orthographic projection from simple machine Blocks in I st Angle Method.

54. –do-

55. –do-

56. –do-

57. –do-

58. –do-

59. –do-

60. Free hand sketching from trade related tools like, Hammer screw driver, cutting pliers, drills, Reamers, Spanners, Files, Chisels, and Bench vice, Pipe vice, Hand Hacksaws.

61. –do-

62. –do-

63. –do-

64. –do-

65. –do-

66. –do-

67. –do-

68. –do-

69. –do-

70. –do-

71. –do-

72. Free hand sketching from measuring instrument. Like Vernier Caliper, Micrometer, & Vernier height gauge.

73. –do-

74. –do-

75. Sketches for Bolts, nuts, Screws and other screwed members.

76. –do-

77. –do-

78. –do-

79. Drawing of Standard Rivet forms as per ISI.

80. Drawing of Riveted joints.

81. –do-

82. –do-

83. Sketches of keys, cotters, and pin joints.

84. –do-

85. –do-

86. –do-

87. Sketches for simple pipe union with a simple pipe line drawing.

88. –do-

89. –do-

90. Simple Ex. in related to missing lines.

91. –do-

92. Simple Ex. related to missing views.

93. –do-

94. Simple Ex. in related to missing dimensions.

95. –do-

96. –do-

97. Blue print Reading.

98. –do-

99. –do-

100. –do-

101. –do-

102. Revision

103. Revision

104. Test

SYLLABUS FOR INDUSTRIAL FITTER

WEEKWISE WORKSHOP CALCULATION AND SCIENCE SY LLABUS

WEEK NO:	SYLLABUS
1.	Arithmetic: Fundamental operations, addition, subtraction. Multiplication, division of decimals number.
2.	–do-
3.	Fraction and decimals conversion fraction to decimal and vice-versa.
4.	Fundamental mathematical operations and simplification problems in fractions
5.	Physical and Mechanical properties of metals.
6.	–do-
7.	Properties and uses of C.I. and W.I
8.	Manufacturing process of big Iron, C.I & W.I
9.	Properties and uses of plain carbon steel and alloy steel.
10.	–do-
11.	Properties and uses of copper; zinc, lead, tin, aluminum.
12.	–do-
13.	Composition, Properties and uses of brass, bronze, solder, bearing, metal.
14.	–do-
15.	Properties and uses of non Metals.
16.	–do-
17.	Effect of alloying elements on the property of C.I & steel.
18.	–do-
19.	Square root arithmetic and problems.
20.	–do-
21.	Ness city of heat trestment and their process.
22.	–do-
23.	Heat treatment of steel- hardening, annealing, tempering, normalizing, case-hardening, standard and measurement.
24.	–do-

25. Percentage, changing percentage to decimal and fraction and vice-versa. Applied problems.

26. –do-

27. Problem on percentage related to trade.

28. –do-

29. System of units, British, metric and SI units for length, area volume, capacity, weight, time, angle, their conversions,

30. –do-

31. Unit of temperature force & related problems.

32. –do-

33. Mass, volume, density, sp. Gravity & specific weight conversion problems from M.K.S to F.P.S and vise versa.

34. –do-

35. Force weight, temperature and heat, conversion problems from M.K.S to F.P.S and vise versa.

36. –do-

37. Ratio & proportion, Ratio, finding forms and ratio proportions, direct proportion and indirect proportion.

38. –do-

39. Application of ratio and proportion to related problems.

40. –do-

41. Inertia, rest and motion velocity and acceleration.

42. –do-

43. Concept of scalar and vector quantity with examples, Newton's Law of motion.

44. –do-

45. Definition of work, power, energy, P.E & K.E.

46. –do-

47. Work energy and power their units and applied problems.

48. –do-

49. Algebraic symbols fundamental algebra operations, sign and symbols use in algebra coefficient terms, and unlike terms.

50. –do-

51. Algebraic addition, subtraction, multiplication and division.

52. –do-

53. Power and exponent. Laws of exponent.

54. –do-

55. Algebraic simplification problems.

56. –do-

57. Factors and equations: Algebraic formula.

58. –do-

59. Equations simple simultaneous.

60. –do-

61. Equations simple simultaneous, quadratic.

62. –do-

63. Application, construction and solution of problems by equation.

64. –do-

65. Simple machines-principle, velocity ratio mechanical advantage, efficiency and their definitions.

66. –do-

67. Simple machines-principle, velocity ratio mechanical advantage, efficiency simple problems.

68. –do-

69. Simple machines like winch pulley and compound axle etc.

70. –do-

71. Simple problems on straight and bell cranked lever.

72. –do-

73. Mensuration: Plain figures-triangles, square, rectangles, parallelogram.

74. –do-

75. Plain figures. Trapezium regular polygons, circle hollow circles.

76. –do-

77. Solid figures: Prism, cylinder, and their problems.

78. –do-

79. Solid figures: pyramid, cone and their problems.

80. –do-

81. Solid figures: Frustum of a cone, sphere spherical segment.

82. –do-

83. Material weight and cost problems related to trade.

84. –do-

85. Specific gravity principle of Archimedes.

86. –do-

87. Relation between specific gravity and density simple experimental determination.

88. –do-

89. Different types of loads, stress, strain modulus of elasticity.

90. –do-

91. Ultimate strength different types of stress, factor of safety examples and their problems.

92. –do-

93. Further problems in stress, strain and young modules.

94. –do-

95. Graphs : co-ordinates, graphs of straight line, related to two sets of varying quantities.

96. –do-

97. Further problems related to trade

98. do-

99. Revision.

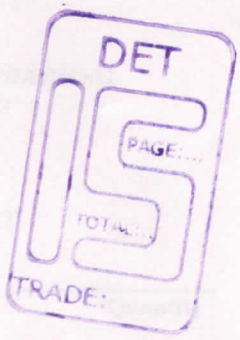
100. Revision.

101. Test.

102. Revision.

103. Revision.

104. Test.



Achievements:

The trainee should be able to

1. **Use fitters' hand tools.**
2. **Use of precision measuring instruments**
3. **Do filing, Hacksawing, chipping and fitting**
4. **Arc and gas welding**
5. **Do lathe operations**
6. **Use tap and Dies**
7. **Do milling operations**

DEPARTMENT OF EMPLOYMENT AND TRAINING
INDUSTRIAL SCHOOL PATTERN

TRADE: INDUSTRIAL FITTER

LIST OF TOOLS AND EQUIPMENT
For a Batch of 20 trainees

Sl No.	Name of the Tools & Equipment	Quantity
1	2	3
1.	Rule steel 15 cm with metric graduations	20
2.	Try Square 10cm blade	20
3.	Out side Caliper 15cm (Spring)	10
4.	Inside Caliper 15cm (Spring)	10
5.	Jenny Caliper 15cm	10
6.	Divider 15 cm (Spring)	10
7.	Scriber 15 cm	20
8.	Centre Punch 10 cm	10
9.	Screw driver 15 cm	10
10.	Cold Chisel (Flat 19mm)	20
11.	Ball Peen Hammer 0.45 kg. with handle	10
12.	Ball Peen Hammer 0.22 kg. with handle	20
13.	Flat File 25 cm. (Second cut.)	20
14.	Flat File 25 cm. (Smooth)	20
15.	Flat File 25 cm. (Bastard)	20
16.	Half Round File (Second cut) 15 cm.	20
17.	Round File (Second cut) 15 cm.	20
18.	Triangular File (Second cut) 15 cm	20
19.	Safe Edge File (Second cut) 15 cm	10
20.	Hacksaw frame (Adjustable) 20-30 cm	20
21.	Needle File (Set of 12)	2
22.	Dot punch	10
	General Tools/Instruments	
23.	Rule steel 30 cm to read metric.	2
24.	Surface Plate 45 cm x 45cm. with Steel Table	2
25.	Marking table 91 x 91 x 122 cm.	1
26.	Vee Block 7 cm with clamps	1
27.	Adjustable Square 15 cm blade	2
28.	Angle plate 10 x 20 cm.(With Slot)	2
29.	Spirit Level 15 cm (Metal)	1
30.	Letter Punch 3 mm set	1
31.	Number Punch 3 mm set	1
32.	Twist Drill S/S 3 to 12 mm by 0.5mm	1 Set
34.	Taps and dies complete set in box (Metric)	1
35.	Square File 15 cm second cut	4
36.	Feeler gauge 10 blades.	1 Set
37.	Wire gauge	1
37.	Oil Stone 15 cm x 5 cm x 2.5 cm	1

38.	Can oil (250 ml)	2
39.	Combination Pliers 15 cm	2
40.	DE Spanner .6mm. to 25 mm	1 set
41.	Adjustable Spanner 20 cm	1
42.	Magnifying Glass 7 cm	2
43.	Clamp "C" 10 cm	1
44.	Reamer taper 4 mm to 9 mm set of 4	1 Set
45.	Flat Scraper 15 cm	1
46.	Triangular Scraper 15 cm	1
47.	Half Round Scraper 15 cm	1
48.	Combination set 30 cm.	1
49.	Micrometer 0-25 mm (Outside)	1
50.	Micrometer 25-50 mm (Outside)	1
51.	Micrometer 25-50 mm (Inside)	1
52.	Vernier caliper (Dial) 0-130mm	1
53.	Vernier caliper 20 cm	1
54.	Vernier height gauge 30 cm	1
55.	Vernier bevel protractor	1
56.	Dial test indicator (.01 mm on stand)	1
57.	Depth micrometer 0-100 mm (0.01 mm)	1
58.	Sine bar 125 mm	1
59.	Pipe wrench 30 cm	1
60.	Pipe vice No.4	1
61.	Machine Vice 15 cm	1
62.	Vice bench 12 cm jaw	1
63.	Work Bench 240x120x60 cm	20
64.	Almirah 180 x 90 x 30 cm	5
65.	Black board (Glass)	2
66.	Fire extinguisher	1
67.	Fire buckets	2
68.	Safety goggles	4
69.	Soldering Iron 350gms	10
70.	Blow Lamp 0.55litres	2
71.	Tool Makers' Clamp (5 cm & 7.5 cm)	2
72.	Stud Extractor	Each one
73.	Screw Pitch Gauge	1set
74.	Twist Drill (T/S) 6-25mm by 1.5	1
75.	Wheel Dresser (Diamond)	1Set
76.	Sleeve (Morse Taper) 0-1,1-2,2-3	1
77.	Trainees Cupboard (10 Compartments)	1Set 2

Allied – Black smithy

78.	Hammer smith 2kg with handle	2
79.	Tongs round	2
80.	Tong flat	2
81.	Smith's square 45cm x 30cm	1
82.	Cold set rodded	2
83.	Hot set rodded	1
84.	Swages top & bottom 12mm/19mm,25mm (pair)	1each
85.	Swage block 35x35x12cm	1
86.	Flatters (rodded) 55mm square	2

87.	Fuller top & bottom 6mm, 9mm (pair)	2
88.	Anvil 50kg (With Stand)	1
89.	Leg vice (10cm Jaw)	1
89.	Shovel	2
90.	Rake	2
91.	Quenching tank	1
92.	Pocker	2
93.	Hardie	2
94.	Leather apron	2
95.	Prick punch	2

Allied – Sheet Metal Work

96.	Mallet	1
97.	Straight Snips	1
98.	Setting hammer with handle	1
99.	Planishing hammer	1
100.	Snip bent 25cm	1
101.	Hatchet Stake	1
102.	Grooving Stake	1
103.	Wing compass (25.4 cm or 30 cm)	2

Allied – Welding

104.	welding cable to carry 400 amps with flexible rubber cover	25 metre
105.	Lugs for cable	12 Nos
106.	Earth clamps	2 Nos
107.	Arc welding table (all metal top) 122cm x 12 cm x 60cm with positioner	1 No
108.	Gas welding with positioner	1 No
109.	Welding torch tips of different sizes	1 Set
110.	Gas lighter	6 No
111.	Trolley for gas cylinder	1 No
112.	Chipping hammer	2 Nos
113.	Gloves (leather)	2 Pairs
114.	Welding torches 5 to 10 nozzles	1 Set
115.	Spindle key for cylinder valve	2 Nos
116.	Welding goggles	4 pairs
117.	Welding helmet with coloured glass	2 Nos
118.	Tip cleaner	10 sets

Milling Cutters

119.	Cylindrical cutter 63x90 bore dia IS : 1831-1961	1Nos
120.	Side and Face cutter B160 x 10 IS:6308-1971	1Nos
121.	Side and Face cutter A200x20 IS:6308-1971	1Nos
122.	Equal angle cutter 45^0/100 IS:6326-1971	1Nos
123.	Single angle cutter 63x18x60^0 RH IS:6324-1971	1No
124.	End Mill cutter 3,6,10,12,16,19	1Set

General Machinery

1.	Drilling machine bench sensitive0-12mm cap motorized with chuck and key	1
2.	Forge portable hand blower 38cm to 45cm	1
3.	Grinding machine (General purpose)D.E. pedestal with 20 cm dia. wheels rough and smooth with twist drill grinding attachment.	1
4.	Lathe all geared head stock S.S. and S.C. height of centre over bed 15 cm gap head complete with accessories e.g. pump, all fitting and splash guard driving plate with drives, face plate 3 jaw and 4 jaw chucks fixed and traveling steady compound turret tool post, taper turning attachment, fixed and running centres, driving dogs straight and bent tails.	1
5.	Welding Transformer set 300 amps – Continuous welding current with all accessories and electrode holder	1Set
6.	Oxy acetylene gas welding set equipment with hoses, regulators and other accessories	1 Set
7.	Milling Machine universal horizontal with all attachments.	1 No.