

SYLLABUS

FOR THE TRADE OF

SHEET METAL WORKER

UNDER

CRAFT INSTRUCTOR'S TRAINING SCHEME

**DESIGNED BY
GOVERNMENT OF INDIA
MINISTRY OF LABOUR (DGE&T)
CENTRAL TRAINING INSTITUTE
#10, ALANDUR ROAD
Guindy: Chennai-32.**

SYLLABUS

FOR THE TRADE OF

SHEET METAL WORKER

**TRADE TECHNOLOGY
MODULE -I**

UNDER

CRAFT INSTRUCTOR'S TRAINING SCHEME

**DESIGNED BY
GOVERNMENT OF INDIA
MINISTRY OF LABOUR (DGE&T)
CENTRAL TRAINING INSTITUTE
#10, ALANDUR ROAD
Guindy: Chennai-32.**

GENERAL INFORMATION

1. NAME OF THE TRADE: SHEET METAL WORKER

2. DURATION: 3 MONTHS
Trade Technology-I module

3. ENTRY QUALIFICATION:

NTC and NAC

or

NTC With 1 year experience

or

NAC three years trade apprenticeship training

or

Passed Diploma in Mechanical Engg.,

or

Degree in mechanical Engg.,

4. WORKSHOP SPACE: 102 Sq.mtr.

LIST OF MEMBERS

1. Shri. D. Vijayakumar
Principal/Joint Director
Central Training Institute for Instructors
Guindy, Chennai – 600032.
2. Shri. M.S. Balakrishnan
Deputy Director of Training
Central Training Institute for Instructors
Guindy, Chennai – 600032.
3. Shri. R. Murugarajan
Assistant Director of Training
Central Training Institute for Instructors
Guindy, Chennai – 600032.
4. Shri. V.L. Ponmozhi
Training officer
Central Training Institute for Instructors
Guindy, Chennai – 600032.
5. Shri. M. Tamizharasan
Deputy Director of Training
Advanced Training Institute
Guindy, Chennai – 600032.
6. Shri. M. Kumaravel
Assistant Director of Training
Advanced Training Institute
Guindy, Chennai – 600032.
7. Shri.V. Muralidharan
Fabrication engineer,L&T Ltd
Mappakkam,Chennai.
8. Shri.K. Murugesan
A.T.O.,Govt. ITI, Guindy, Chennai – 600032
9. Shri.R. Kumaraguru
Training Officer
RDAT,Guindy , Chennai -600032.
10. Shri.S. Bakthavatchalu
Training Officer (Retd),CTI, Guindy, Chennai -600032.

11. Shri.S. Anil Kumar
H.O.D./Mechanical
Shri Balaji polytechnic College.
Kolappakkam, Vandaloor, Chennai -600048
12. Shri.R. Sankaran
H.O.D./Mechanical
Valliammai Polytechnic College
S.R.M Nagar, Kattangulathur,
Kanchipuram - 603203
13. Shri. M. Kumar
Lecturer, Tool and Die Making.
Murugappa Polytechnic College,
S.M. Nagar, Chennai -600062.
14. Shri. P. S. Viswanathan,
Deputy manager,
Training and Development,
M/s Ashok Leyland, Chennai.
15. Shri.A. N. Lakshminathan
Training Officer (Retd)
498, 22nd street , TNHB colony
Korattur, Chennai-600080.
16. Shri.K. Vadivelu
A.T.O., (Retd)
5/12, vimala Nagar,
pallikaranai, Chennai-600100.
17. Shri.K. Srinivasan
Welding consultant
Plot No.6/3, Ist main road
Balaji nagar, Nanganallur, Chennai
18. Shri.N. Ravichandran
Jayasri engineers ,
Barathi Nagar, Ist Main road,
Vengaivasal, selaiyur, Chennai-73.

SYLLABUS FOR CRAFT INSTRUCTORS COURSE

TRADE: SHEET METAL WORKERS

TRADE TECHNOLOGY: MODULE: 1

DURATION: 3 Months

Sl. No.	Practical	Theory
1	Familiarization within the institute. Importance of machine used in the trade. Introduction to safety including firefighting equipment and their uses etc-use of protective safety devices and its use in the shop floor.	Importance of safety and general precaution is taken in the misfits away in the section introduction to the trade, safety precautions and protective devices.
2	Planishing of sheet metal, practice in cutting sheet metal to different shapes. practice in marking and cutting sheet metal to various angles.	Metal and non metals-metals and their characteristics-types-sizes and uses of sheet metal. Marking and laying out tools-square-dividers-trammels-marking block – steel rules etc.
3	Practice on cutting with different types of shears. Tin snips (straight cut, right and left cut) cutting off inside and outside curve, cutting off notches and cutting profiles	Various types of shears and their uses description and uses of guillotine shears and circle cutting machine, description of nibbling machine (various operations) straight cutting, circular figure cutting, nibbling shot cutting, notching, circular punching, sequence punches, folding, bending, planishing.
4	Practice on sheet metal seams grooved and locked grooved joint pane down seam, bottom lock seam or corner fold seam (knocked –up seam) corner clip lock, double bottom lock, clip lock snap joint etc.	Sheet metal folded joint-types of sheet metal joint- description of sheet metal seamed, grooved seam, locked grooved seam, knocked up seam etc.
5	Development on parallel line method and forming rectangular shapes using stakes. Forming cylindrical tin using various stakes hollow mandrel, hatchet stakes man's anvil etc. Folding bending sheet metal to 90 degree using wooden mallet, 'L' clamps etc.	Sheet metal work tools bevellers vice, c clamps pliers' bevellers stales (or) sheet formers types and their uses. Uses of groover and grooving rail methods applied in laying in pattern parallel line, radial line, Triangulation and geometrical construction.

6	Preparation of soft solder stickers, preparation fluxes, Practice soft soldering on lap joints sunk lap joint and plated butt joint., making round cylinder with soldered lap joint & sweating practice.	Solder-types-and their composition use in fluxes, their on different metals- soldering bit-types and classification- weight of soldering process if soldering (soft and hand) and brazing. Heat appliances- Hand force, Brass lamp.
7	Making a cylindrical container with knocked-up(bottom lock), Grooved joint and hemmed top.	Sheet metal Hammers -types-classification and their uses. Mallets, types of material and Description of Hacksaw frame blades-their Specification.
8	Making holes with solid and ruined are of Hollow Punches for making holes in sheet metal with the help of grained block of wood.	Solid and Hollow punches, Description of hand punches-hollow punches and their uses. Laying out pattern of elbow pipe and 'T' pipe equal dia.
9	Making holes in sheet-metal using punches machine and twist drill-use of hand electric drilling machine. Grinding a drill bit-Riveting practice using Various types of Rivet heads single chain riveted joint, double chain riveted joint and zig zag riveted joints.	Description of hand punching machine,Hand / power operated drilling machine drill bits-packs-effects cutting angles-Angles for drilled and punched holes, Rivets and its parts-selection of Rivet head, types of Rivet and uses. Calculation for riveting allowances(pitch and Lap)
10	Making a taper tray with Riveted corner. Making a dust pan, corner and handle riveted.	Selection of Rivets with reference to type of joint according to thickness, Riveting tools-Description riveting gun, rivet squeezer.
11	Making a fire backed with lap riveted joint on one side and locked grooved joint on the other side.	Technical abbreviation used is the trade. Definition of Trade Terms such as pattern, development, stretch out pattern, master pattern (Gross pattern), Template
12	Revision and Examination	Revision and Examination.

TRADE : SHEET METAL WORKER

List of Tools and Equipment (for a batch of 16 trainees)

TRAINEES KIT	FOR T.O.,	FOR TRAINEES
1. Steel Rule 300 mm	1	16
2. Wing Divider 200 mm	1	16
3. Centre Punch 100 mm	1	16
4. Spring Dividers 150 mm	1	16
5. Ordinary Wooden Mallet 50 mm	1	16
6. Soldering Copper Hatchet Type 0.25 kg	1	16
7. Cross peen Hammer 0.25 kg with handle	1	16
8. Protractor with blade 150 mm	1	16
9. Steel Tape 2 metres	1	16
10. Ballpane Hammer 0.5 kg with handle	1	16
11. Scriber 150 mm x 3 mm (Enginee's)	1	16

SHOP OUT FIT PER UNIT

12. Steel Square 450 mm x 600 mm	4 Nos.
13. Sheet Metal Gauge	4 Nos.
14. Hatcher Stake	4 Nos.
15. Stake Round and Bottom	4 Nos.
16. Half Moon Stake	4 Nos.
17. Funnel Stake	4 Nos.
18. Anvil Face Stake	4 Nos.
19. Bick Iron Stake	4 Nos.
20. Tinman's Horse	4 Nos.
21. Hammer Peaning with handle	4 Nos.
22. Hammer Creasing with handle	4 Nos.
23. Hammer Planishing with handle	4 Nos.
24. Hammer Block with handle	4 Nos.
25. Shear Tinman's 300 mm	4 Nos.
26. Snips straight 250 mm	4 Nos.
27. Right cut snips 250 mm	4 Nos.

28. Left cut snips 250 mm	4 Nos.
29. Hand Shear Universal 250 mm	4 Nos.
30. Punch Round 3 mm Dia	4 Nos.
31. Punch Round 4 mm Dia	4 Nos.
32. Punch Round 6 mm Dia	4 Nos.
33. Rivet sets snap and Dolly combined 3 mm	4 Nos.
34. Rivet sets snap and Dolly combined 4 mm	4 Nos.
35. Rivet sets snap and Dolly combined 6 mm	4 Nos.
36. Chisel cold flat 25 mm x 250 mm	4 Nos.
37. Punch Letter 4 mm	1 set
38. Punch Number 4 mm	1 set
39. File flat 250 mm second cut	2 Nos.
40. File flat 300 mm smooth	2 Nos.
41. File flat 300 mm bastard	2 Nos.
42. File half round 300 mm smooth	2 Nos.
43. Hacksaw frame 300 mm adjustable (Tubular)	4 Nos.
44. Hand Groover 3 mm	4 Nos.
45. Hand Groover 4 mm	4 Nos.
46. Hand Groover 5 mm	4 Nos.
47. Plier Combination 150 mm	2 Nos.
48. Grip Wrench 200 mm	2 Nos.
49. Ladle 150 mm Dia.	2 Nos.
50. Blow Lamp 1 litre	2 Nos.
51. H.S.S. Twist Drill 3 mm, 4 mm & 6 mm (Parallel Shank)	
52. Hand Drill 0 to 6 mm, 8 mm, 10 mm & 12 mm	2 Nos.
53. Soldering Copper Hatchet type 500 gms.	8 Nos.
54. Pneumatic rivet gun	2 Nos.
55. Trammel Point (with beam 600 mm)	1 No.
56. Vernier caliper (0 mm – 150 mm)	1 No.
57. Micrometer Outside (0 to 25 mm)	1 No.
58. Rasp cut file 250 mm	4 Nos.
59. D.E. Spanner G.P. (6 mm to 32 mm) (Set of 12 spanner)	2 Set
60. Bossing Mallet	4 Nos.

61. Endfaked Mallet	4 Nos.
62. Soft Hammer (Brass, Copper; Lead, Rubber And Rawhide heads with handle)	4 Nos.
63. Steel Rule 600 mm	4 Nos.
64. Oil Can Pressure feed 500 ml	2 Nos.
65. Raising Hammer with handle	4 Nos.
66. Rawl Punch holder and bits (No. 8,10,12,14)	2 Sets
67. Hollowing Hammer with handle	4 Nos.
68. Trepanning tool 70 mm	1 No.
69. Safety Glasses	4 Pairs
70. Hand vice 50 mm	4 Nos.
71. Steel wire Brush 50 mm x 150 mm	4 Nos.
72. Gloves for Welding (Leather and Asbestos)	4 Nos.
73. Leather Apron	4 Nos.
74. Tongs, Close mouth and pick up (1 each)	2 Pairs.
75. Portable Electric drill (Single phase)	2 Nos.
76. Crow bar 910 x 25 mm	2 Nos.
77. Trowel Medium	1 No.
78. Trowel small	1 No.
79. Pop rivet gun	2 Nos.
80. Lazy Tong	2 Nos.
81. Screw Driver 250 mm	2 Nos.
82. Round File 2 nd Cut 250 mm	4 Nos.
83. Triangular File Smooth 250 mm	4 Nos.
84. Square File 2 nd Cut 250 mm	4 Nos.
85. Needle File (Swiss File) 150 mm 1 set of	12 Nos.
86. 'C' Clamp 150 mm	2 Nos.

GENERAL INSTALLATION

1. Light General purpose portable forges	2 Nos.
2. Liquefied Petroleum Gas (L.P.G) Cylinder, Regulator and Torch with Burner	2 Nos.
3. Bench lever shears 250 mm Blade x 3 mm capacity	1 No.

4. Air compressor (Pressure and displaced of air)	
pneumatic Pop rivet Gun	1No
5. Spray Gun (Painting) 500 ml	1No
6. Combination turning up and wiring machine	1No
7. Guillotine shearing Machine foot operated (1 mt x 18 Gauge. Capacity)	1 No.
8. Welding Plant oxy- Acetylene completes (high Pressure) (to be provided where no welding trade exists)	1 No.
9. Circle cutting machine 300 mm dia.	1 No.
10. Pillar type drilling machine 12 mm	1 No.
11. Slip roll former 1.6 mm x 1000 mm	1 No.
12. D.E. Grinder pedestal motorized 200 mm	1 No.
13. Anvil 50 kgs with Stand	1 No.
14. Bench vice 120 mm, 150 mm	1 No.
15. Fly press/Ball press No.4 single body	1 No.
16. Power Press 20 Tons	1 No.
17. Buffing and Polishing Machine	1 No.
18. Nibbling Machine	1 No.
19. Spinning Lathe	1 No.
20. Seaming machine	1 No.
21. Work Bench 1820 x 1310 x 760 mm	1 Nos.
22. Almirah 1820 x 1210 x 450 mm	1 Nos.
23. Metal rack 1820 x 1520 x 450 mm	1 Nos.
24. Steel Lockers with 8 Drawers	2 Nos.
25. Fire extinguisher Soda Acid and foam type	1 each
26. Fire buckets with Stand	4 Nos.
27. Instructor's Table	1 No.
28. Black Board with Easel	1 No.
29. Wooden Stool 450 mm	1 No.
30. Portable Nibbler	2 No.
31. Portable pneumatic Shear	2 No.
32. Pipe Bending machine (Hydraulic Type) 12 mm to 30 mm	1 No.
33. Hand Press Brake Capacity (0.8 mm)	1 No.

- | | |
|---|-------|
| 34. Beading Machine with 380 mm throat
Clearance (with crimping rollers) | 1 No. |
| 35. Welding Transformer (200 to 400 Amps) | 1 No. |
| 36. Gas Welding Table 1220 mm x 760 mm | 1 No. |
| 37. Spot Welding Machine | 1 No. |
| 38. Tin smiths bench folder 600 x 1.6 mm | 1 No. |
| 39. Over Head projector | 1 No. |

SYLLABUS

FOR THE TRADE OF

SHEET METAL WORKER

**TRADE TECHNOLOGY
MODULE -II**

UNDER

CRAFT INSTRUCTOR'S TRAINING SCHEME

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CENTRAL TRAINING INSTITUTE
#10, ALANDUR ROAD
Guindy: Chennai-32.**

GENERAL INFORMATION

1. NAME OF THE TRADE: SHEET METAL WORKER

2. DURATION: 3 MONTHS
Trade Technology-II module

3. ENTRY QUALIFICATION:

**Should have completed TT module I on
SHEET METAL WORKER trade**

4. WORKSHOP SPACE: 102 Sq.mtr.

LIST OF MEMBERS

1. Shri. D. Vijayakumar
Principal/Joint Director
Central Training Institute for Instructors
Guindy, Chennai – 600032.
2. Shri. M.S. Balakrishnan
Deputy Director of Training
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Training officer
Central Training Institute for Instructors
Guindy, Chennai – 600032.
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Deputy Director of Training
Advanced Training Institute
Guindy, Chennai – 600032.
6. Shri. M. Kumaravel
Assistant Director of Training
Advanced Training Institute
Guindy, Chennai – 600032.
7. Shri.V. Muralidharan
Fabrication engineer,L&T Ltd
Mappakkam,Chennai.
8. Shri.K. Murugesan
A.T.O.,Govt. ITI, Guindy, Chennai – 600032
9. Shri.R. Kumaraguru
Training Officer
RDAT,Guindy , Chennai -600032.
10. Shri.S. Bakthavatchalu
Training Officer (Retd),CTI, Guindy, Chennai -600032.

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Lecturer, Tool and Die Making.
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pallikaranai, Chennai-600100.
17. Shri.K. Srinivasan
Welding consultant
Plot No.6/3, Ist main road
Balaji nagar, Nanganallur, Chennai
18. Shri.N. Ravichandran
Jayasri engineers ,
Barathi Nagar, I st Main road,
Vengaiwasal, selaiyur, Chennai-73.

SYLLABUS FOR CRAFT INSTRUCTORS COURSE

TRADE: SHEET METAL WORKERS

TRADE TECHNOLOGY: MODULE: 2

DURATION: 3 Months

Sl. No.	Practical	Theory
13	Practice in drilling holes in walls and ceilings as applied to ducting work. Use of rawl bits and rawl plug.	Sheet metal terms-folding, bending, scanning, Turning, Grooving, Edge stiffening, Hemming, wiring, swaging etc. Development of spherical/hemi spherical shapes of articles.
2	Practice on hollowing and raising as Ferrous and non-ferrous sheets. Practice on removing bends on spherical and hemi-spherical articles wing wheeling and raising machine.	Description a wheeling and raising machine. Clips and connectors-uses-types and allow users of 's' clips, government clips, drive clips, mailing clips etc.
3	Making scoop with handle by using hemming, locked grooved joint and soldering	Laying out pattern cylinder out obliquely, perception of roll forming machine, types operating principle. Descriptions a ship roll forming machine and its function.
4	Making a rectangular article with false wired edge Wiring practices on straight edges wiring practice on curved edge.	Description of folder - types - ban folders, wing adjustments and explanations. Fastening a sheet metal-various types of fastening devices for sheet metal, screws self threaded screws etc.
5	Making cylindrical mug with wired edges, side and bottom locked grooved and knocked up joint, with hemmed edge handle riveted.	Brief description a hydraulic pipe handing machines-its pacts-operating principle etc. Corrosion an metals and anti corrosive treatment.

6	Making funnel with wired edge, locked grooved and soldered lap joint	Pattern development a frustum cone, laying out pattern conical elbows.
7	Making BUCKET by using wiring, locked grooved seam, lap soldering, humming and beading etc.	Description A swaging and beading machine its result, operating principle etc.
8	To make a 90 degree and 60 degree with equal diameter pipe, to make a 90 degree 'T' piece with unequal diameter practice on pipe bending machine.	Development a 'T' pipe round equal and unequal diameter. Introduction to tube and pipes. Description and operating principles & seaming machine.
9	Allied Trade Training welding. Simple tacking by gas welding on famous metal sheets. Practice in gas welding butt joints on ferrous metals practice on spot welding. Prepare a tray with welded corners. Brazing copper and Brass articles, silver brazing of copper pipes.	Brief description on Arc/ Gas welding loop, accessories And equipments , gases used in welding precautions to be taken while operating gas cylinder, description on filler rods electrodes, Fluxes and its uses methods brazing using blow pipes. Simple explanation about the use of oxy-Acetylene gas cutting
10	Allied trade training: fitting. Sawing by-hacksaw, clipping filing – cross and draw, practice on external threading using 'Die Stock'. Practice on internal threading using Taps.	Description of files –types-classification –chisel-types-specification area cutting angles for different metals use of Die and Die holder, Description of Taps and Tap. Brief description a reamers and their uses.
11	Simple cavity operations such as drawing cut, punching, angle iron bending in different angles and radius. Twisting the square and flat rods.	Brief description of blacksmith hand tools and hammers. Types of forge, forging fuel and heat treatment process. Description of fly press and ball press.
12	Revision and Examination	Revision and Examination.

TRADE : SHEET METAL WORKER

List of Tools and Equipment (for a batch of 16 trainees)

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1. Steel Rule 300 mm	1	16
2. Wing Divider 200 mm	1	16
3. Centre Punch 100 mm	1	16
4. Spring Dividers 150 mm	1	16
5. Ordinary Wooden Mallet 50 mm	1	16
6. Soldering Copper Hatchet Type 0.25 kg	1	16
7. Cross peen Hammer 0.25 kg with handle	1	16
8. Protractor with blade 150 mm	1	16
9. Steel Tape 2 metres	1	16
10. Ballpane Hammer 0.5 kg with handle	1	16
11. Scriber 150 mm x 3 mm (Enginee's)	1	16

SHOP OUT FIT PER UNIT

12. Steel Square 450 mm x 600 mm	4 Nos.
13. Sheet Metal Gauge	4 Nos.
14. Hatcher Stake	4 Nos.
15. Stake Round and Bottom	4 Nos.
16. Half Moon Stake	4 Nos.
17. Funnel Stake	4 Nos.
18. Anvil Face Stake	4 Nos.
19. Bick Iron Stake	4 Nos.
20. Tinman's Horse	4 Nos.
21. Hammer Peaning with handle	4 Nos.
22. Hammer Creasing with handle	4 Nos.
23. Hammer Planishing with handle	4 Nos.
24. Hammer Block with handle	4 Nos.
25. Shear Tinman's 300 mm	4 Nos.
26. Snips straight 250 mm	4 Nos.
27. Right cut snips 250 mm	4 Nos.

28. Left cut snips 250 mm	4 Nos.
29. Hand Shear Universal 250 mm	4 Nos.
30. Punch Round 3 mm Dia	4 Nos.
31. Punch Round 4 mm Dia	4 Nos.
32. Punch Round 6 mm Dia	4 Nos.
33. Rivet sets snap and Dolly combined 3 mm	4 Nos.
34. Rivet sets snap and Dolly combined 4 mm	4 Nos.
35. Rivet sets snap and Dolly combined 6 mm	4 Nos.
36. Chisel cold flat 25 mm x 250 mm	4 Nos.
37. Punch Letter 4 mm	1 set
38. Punch Number 4 mm	1 set
39. File flat 250 mm second cut	2 Nos.
40. File flat 300 mm smooth	2 Nos.
41. File flat 300 mm bastard	2 Nos.
42. File half round 300 mm smooth	2 Nos.
43. Hacksaw frame 300 mm adjustable (Tubular)	4 Nos.
44. Hand Groover 3 mm	4 Nos.
45. Hand Groover 4 mm	4 Nos.
46. Hand Groover 5 mm	4 Nos.
47. Plier Combination 150 mm	2 Nos.
48. Grip Wrench 200 mm	2 Nos.
49. Ladle 150 mm Dia.	2 Nos.
50. Blow Lamp `1 litre	2 Nos.
51. H.S.S. Twist Drill 3 mm, 4 mm & 6 mm (Parallel Shank)	
52. Hand Drill 0 to 6 mm, 8 mm, 10 mm & 12 mm	2 Nos.
53. Soldering Copper Hatchet type 500 gms.	8 Nos.
54. Pneumatic rivet gun	2 Nos.
55. Trammel Point (with beam 600 mm)	1 No.
56. Vernier caliper (0 mm – 150 mm)	1 No.
57. Micrometer Outside (0 to 25 mm)	1 No.
58. Raspcut file 250 mm	4 Nos.
59. D.E. Spanner G.P. (6 mm to 32 mm) (Set of 12 spanner)	2 Set
60. Bossing Mallet	4 Nos.

61. Endfaked Mallet	4 Nos.
62. Soft Hammer (Brass, Copper, Lead, Rubber And Rawhide heads with handle)	4 Nos.
63. Steel Rule 600 mm	4 Nos.
64. Oil Can Pressure feed 500 ml	2 Nos.
65. Raising Hammer with handle	4 Nos.
66. Rawl Punch holder and bits (No. 8,10,12,14)	2 Sets
67. Hollowing Hammer with handle	4 Nos.
68. Trepanning tool 70 mm	1 No.
69. Safety Glasses	4 Pairs
70. Hand vice 50 mm	4 Nos.
71. Steel wire Brush 50 mm x 150 mm	4 Nos.
72. Gloves for Welding (Leather and Asbestos)	4 Nos.
73. Leather Apron	4 Nos.
74. Tongs, Close mouth and pick up (1 each)	2 Pairs.
75. Portable Electric drill (Single phase)	2 Nos.
76. Crow bar 910 x 25 mm	2 Nos.
77. Trowel Medium	1 No.
78. Trowel small	1 No.
79. Pop rivet gun	2 Nos.
80. Lazy Tong	2 Nos.
81. Screw Driver 250 mm	2 Nos.
82. Round File 2 nd Cut 250 mm	4 Nos.
83. Triangular File Smooth 250 mm	4 Nos.
84. Square File 2 nd Cut 250 mm	4 Nos.
85. Needle File (Swiss File) 150 mm 1 set of	12 Nos.
86. 'C' Clamp 150 mm	2 Nos.

GENERAL INSTALLATION

1. Light General purpose portable forges	2 Nos.
2. Liquefied Petroleum Gas (L.P.G) Cylinder, Regulator and Torch with Burner	2 Nos.
3. Bench lever shears 250 mm Blade x 3 mm capacity	1 No.

4. Air compressor (Pressure and displaced of air)	
pneumatic Pop rivet Gun	1 No
5. Spray Gun (Painting) 500 ml	1 No
6. Combination turning up and wiring machine	1 No
7. Guillotine shearing Machine foot operated (1 mt x 18 Gauge. Capacity)	1 No.
8. Welding Plant oxy- Acetylene completes (high Pressure) (to be provided where no welding trade exists)	1 No.
9. Circle cutting machine 300 mm dia.	1 No.
10. Pillar type drilling machine 12 mm	1 No.
11. Slip roll former 1.6 mm x 1000 mm	1 No.
12. D.E. Grinder pedestal motorized 200 mm	1 No.
13. Anvil 50 kgs with Stand	1 No.
14. Bench vice 120 mm, 150 mm	1 No.
15. Fly press/Ball press No.4 single body	1 No.
16. Power Press 20 Tons	1 No.
17. Buffing and Polishing Machine	1 No.
18. Nibbling Machine	1 No.
19. Spinning Lathe	1 No.
20. Seaming machine	1 No.
21. Work Bench 1820 x 1310 x 760 mm	1 Nos.
22. Almirah 1820 x 1210 x 450 mm	1 Nos.
23. Metal rack 1820 x 1520 x 450 mm	1 Nos.
24. Steel Lockers with 8 Drawers	2 Nos.
25. Fire extinguisher Soda Acid and foam type	1 each
26. Fire buckets with Stand	4 Nos.
27. Instructor's Table	1 No.
28. Black Board with Easel	1 No.
29. Wooden Stool 450 mm	1 No.
30. Portable Nibbler	2 No.
31. Portable pneumatic Shear	2 No.
32. Pipe Bending machine (Hydraulic Type) 12 mm to 30 mm	1 No.
33. Hand Press Brake Capacity (0.8 mm)	1 No.

- | | |
|---|-------|
| 34. Beading Machine with 380 mm throat
Clearance (with crimping rollers) | 1 No. |
| 35. Welding Transformer (200 to 400 Amps) | 1 No. |
| 36. Gas Welding Table 1220 mm x 760 mm | 1 No. |
| 37. Spot Welding Machine | 1 No. |
| 38. Tin smiths bench folder 600 x 1.6 mm | 1 No. |
| 39. Over Head projector | 1 No. |

SYLLABUS

FOR THE TRADE OF

SHEET METAL WORKER

**ENGINEERING TECHNOLOGY
MODULE - III**

UNDER

CRAFT INSTRUCTOR'S TRAINING SCHEME

**DESIGNED BY
GOVERNMENT OF INDIA
MINISTRY OF LABOUR (DGE&T)
CENTRAL TRAINING INSTITUTE
#10, ALANDUR ROAD
Guindy: Chennai-32.**

DRAFT SYLLABUS FOR **ENGINEERING TECHNOLOGY MODULE**

Duration : 3 months. (12 weeks)

WEEK NO	Work shop science & Calculation	Engineering Drawing	Remarks
1	<p>Fraction – simple, complex & decimals, Simplification, L.C.M</p> <p>Square roots:</p> <p>Whole Numbers & Fractions.</p> <p>Use of Simple pocket Calculator (Non Scientific) in shop calculation Practice.</p> <p>Units –</p> <p>System of units, Conversion between Metric & British system of units.</p> <p>Metals:</p> <p>Mechanical properties of materials.</p> <p>Ferrous & non-ferrous metals & their allays – properties, composition & their uses.</p>	<p>Line practice – straight line & inclined line.</p> <p>Types of Line & their uses.</p> <p>Conventional symbol of materials.</p> <p>Free hand sketching of Hand tools.</p> <p>Free hand sketching of Electrical hand tools.</p>	
2	<p>Ratio & proportions – shop problems.</p> <p>Percentage – shop problems & applications.</p> <p>Heat – treatment:</p> <p>Critical temperatures, Annealing, Normalizing, Tempering, Hardening, Case- hardening.</p> <p>Mass, speed, velocity, acceleration.</p> <p>Equations of plane motion & motion under force of gravity – applications.</p>	<p>Dimensioning techniques.</p> <p>Use of reduced & enlarged scales.</p>	
3	<p>Logarithm & Antilogarithm – Characteristics & Mantissa.</p> <p>General laws of logarithm.</p> <p>Simplifications using Logarithm:</p> <p>Practice on different exercises.</p> <p>Algebra :</p> <p>Simplifications, different algebraic formulae & applications.</p> <p>Newton’s three laws of motion – prove that $p=m.a$</p> <p>Force & Weight – Their units,</p>	<p>Practice on Isometric views of simple objects.</p> <p>Symbols.</p> <p>Orthographic projection – difference between 1st angle and 3rd angle projections.</p> <p>Orthographic view of simple blocks in 3rd angle method.</p>	

	<p>applications. Work – Power – Energy: definitions, units, B.H.P., I.H.P. & efficiency of an engine.</p>		
4	<p>Solving Equations – Simple, quadratic & simultaneous equations, transpositions etc. Problems on Algebra – shop problems. Potential energy & Kinetic energy – applications. Energy calculation in domestic & industrial circuits. Simple stress & strain – different types. Elastic limit, ultimate strength, safe stress, factor of safety.</p>	<p>Orthographic views of different blocks in 3rd angle projection.</p>	
5	<p>Mensuration: Area of different triangles square, rectangle, trapezium, rhombus, parallelogram, circle, semi circle, sector, segment etc. – shop problems. Basic electricity – Current, Voltage, EMF, resistance, Ohm’s Law, series & parallel circuits. Hook’s Law, Young’s Modulus of elasticity, Poisson’s ratio – shop problems. Lever – different types, working principle. Moment of a lever – technical problems.</p>	<p>Practice on Orthographic view - 3rd angle projections.</p>	
6	<p>Mensuration – Area & perimeter of an ellipse, shop problems. Volume of solids & hollow bodies – prism and pyramids. Volume of cube, cuboids, Rectangular solids, hexagonal prism, triangular prism etc. Shop problems. Specific resistance, temperature co-efficient of resistance applications. Composition & resolution of forces. Law of parallelogram of forces. Lami’s Theorem shop problems.</p>	<p>Practice on Orthographic views - 3rd angle projections.</p>	
7	<p>Volume & surface area of solid & hollow cylinders, hexagonal, triangular, square pyramids, etc.,</p>	<p>Practice on Orthographic views of different objects in 1st angle projection. (Casting Component</p>	

	<p>Applications & shop problems. Heating effects of electric current – applications. Density, Specific gravity & Archimedes principle – applications. Principle – applications. Determination of specific gravity of solids & liquids using Archimedes principle – applications.</p>	<p>diagram)</p>	
8	<p>Volume & surface area of a cone, taper cylinder, solid & hollow sphere, Hemi sphere – applications & technical problems. Kirchhoff's Law – Voltage law & Current law, applications in different combination, solving problems. Heat & Temperature – Their units, Effects of heat, Specific heat, Latent heat.</p>	<p>Orthographic views Different objects of Ist angle Projection.</p>	
9	<p>Trigonometry – properties of triangles & acute angles, Different system of units for measuring angles. Trigonometric Rations & Functions – different formulae, trigonometric proof, height & distance problems, taper calculations, - technical problems. Sensible heat, Thermal capacity, Water equivalent of heat – applications. Temperature – Different thermometric scales & conversions between them, temperature measuring instruments. Difference between heat & temperature. Thermal contact & Thermal expansion – co-efficient of Liner, Superficial & Cubical expansions – shop problems.</p>	<p>Orthographic views of different objects in 1st angle projection. (Casting Component diagram)</p>	
10	<p>Simple machine:</p>	<p>Orthographic views of</p>	

	<p>load, effort, Mechanical Advantage , Velocity Ratio & efficiency of a machine. Simple pulley block, simple wheel & axle. Differential wheel & axle, simple screw jack – technical problems.</p>	<p>different objects in 1st angle projection.</p>	
11	<p>Cost and Estimation of Over head Value of SHEET METAL WORKER.</p>	<p>Orthographic views of different objects in 1st angle projection.</p>	
12	<p>Review on general mathematics & sciences, solving old Question paper. Review on electrical trade base calculations & Question papers. FINAL TEST & FINAL EVALUATIONS.</p>	<p>Basic Symbols of Electricals & Circuits. Review on the courses & Question papers. FINAL TEST & FINAL EVALUATIONS.</p>	
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NOTE: 1. Trainees are allowed to use simple pocket calculator (Non – scientific) during class – room practice & Examinations.

2. Trainees are suggested to use frequently the Mini drafting Machine during practice of Drawing & in Examinations.

3. "SHEET METAL WORKER" Trade related Calculations & Drawings may be taught under related Trade Faculty.

ENGINEERING TECHNOLOGY

ENGG. DRG/ WSC- THEORY CLASS –EQUIPMENTS / TOOLS / ACCESSORIES

1. Junior drafting machine - Each1
2. Set of set square (45°, 30°/60°) (celluloid material) - Each1
3. Circular template (celluloid material) - Each1
4. Protractor (celluloid material) - Each1
5. Square and rectangle template (celluloid material) - 1 by 2
6. Set of French curves (celluloid material) - 1 by 2
7. Compass & divider Box (celluloid material) - Each1
8. Scales
 - a. Full scale (Wood or celluloid) -Each 1set
 - b. Enlarged scale (Wood or celluloid) -Each1set
 - c. Reduced scale (Wood or celluloid) -Each 1set
9. Geometrical Box set- class work (celluloid or wood) -Each 1set
10. Glass Board 8' × 4' - 1No
11. White Board 8' × 4' - 1No
12. Interactive Board with accessories - 1No
13. Computer with Auto-CAD software - 1No

ENGINEERING TECHNOLOGY

SCIENCE LAB-EQUIPMENTS & ACCESSORIES

1. Different metal models
 - Ferrous metal -1 set
 - Non ferrous metal -1 set
 - Alloys -1 set
2. Density
 - Volume and Weight calculation of solid models
(Cube, Cuboids, cylinder, cone, sphere etc.)
 - Vernier Caliper -1no
 - Micrometer -1no
 - Physical balance with weight box -1set
 - ELECTRONIC BALANCE — 5kg (max) - 1unit
 - Spring balance (0.1 to 1kg) -2sets
 - Lactometer -1no
 - Hydrometer -1no
 - Beakers 50cc, 100cc, 200cc -3nos each
 - Cylindrical glass jar -4nos
 - Graduated cylindrical jar(100cc, 500cc) -2nos each
3. Magnet
 - Rectangular solid bar -2nos
 - U-type -1no
4. Pressure
 - Barometer - 1no
 - Manometer - 1no
5. Levers
 - Cutting pliers, scissors, claw hammer - Each 1No
 - Nut cracker, wheel barrow, Trolley - Each 1No
 - Coal tongs, safety valve - Each 1No
 - Cycle Bell - 1No

6. Simple Machine
- Pulley block (Model) -1No
 - Wheel and axle (Model) -1No
 - Wheel and differential axle (Model) -1No
 - Screw Jack (Model) -1No
 - Pulleys
 - Fixed pulleys -1Set
 - Movable pulleys -1Set
7. Work power & energy
- Work calculation – model -1No
 - Energy conversion – model -1No
 - Power calculation - model -1No
8. Friction
- Inclined plane- model -1No
 - Application of friction – model -1No
9. Heat
- Heat transformation equipments (Different metal rods) -1Set
 - Scales of temperature - model -1set
 - Thermometers ($^{\circ}\text{C}$, $^{\circ}\text{F}$, $^{\circ}\text{R}$) -2Each
 - Calorimeter -1no
 - Thermos flask -1no
 - Pyrometer
 - Thermocouple -1no
 - Optical -1no