

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI-51**

1	Name of Syllabus	C. C. IN MECHANIC ASSISTANT (303110)																																									
2	Max. No's of Student	25 Students																																									
3	Duration	6 months																																									
4	Type	Part Time																																									
5	No's Of Days / Week	6 Days																																									
6	No's Of Hours /Days	4 hrs.																																									
7	Space Required	1) Workshop = 800 sq feet 2) Class Room = 200 sq feet TOTAL = 1000 sq feet																																									
8	Entry Qualification	7 <sup>th</sup> Pass																																									
9	Objective Of Syllabus/ introduction	Introduction – the syllabus C.C. In Mechanic Assistant has been evolved in such a way that after completion of course of 6 months, the student would acquire good working skill suited to work as Machinist / Technician . He would also gain confidence to operate machines , drilling machine , arc and gas welding etc. <b>Objective:-</b> 1) Develop skills in Plumber . 2) Develop skill in Fitting and bench work . 3) Develop skill in fabrication by providing adequate knowledge of welding .																																									
10	Employment Opportunity	A) <u>Self – Employment</u> : - Trained student can have his own work shop of repairers or production of grills, steel furniture etc. And also carry out plumbing work. B) <u>Wage - Employment</u> :- Passed out trainee can work in Production and shop.																																									
11	Teacher's Qualification	Diploma in Mech. Engg																																									
12	Training System	<table><tr><th colspan="7">Training System Per Week</th></tr><tr><td>Theory</td><td colspan="2">Practical</td><td colspan="4">Total</td></tr><tr><td>6hrs</td><td colspan="2">18hrs</td><td colspan="4">24hrs</td></tr></table>							Training System Per Week							Theory	Practical		Total				6hrs	18hrs		24hrs																	
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13	Exam System	<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30311011</td><td>MECHANIC THEORY</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30311021</td><td>PLUMBING</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30311022</td><td>FITTING AND WELDING</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>Total</td><td></td><td></td><td>400</td><td>185</td></tr></table>							Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30311011	MECHANIC THEORY	TH-I	3 hrs	100	35	2	30311021	PLUMBING	PR-I	3 hrs	100	50	3	30311022	FITTING AND WELDING	PR-II	6 hrs	200	100			Total			400	185
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2	30311021	PLUMBING	PR-I	3 hrs	100	50																																					
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**SYLLABUS : MECHANIC ASSISTANT**

**THEORY PAPER – I, MECHANIC THEORY**

**A. FITTING -- THEORY**

1) Introduction to safety precautions and its Importance in fitting shop. Linear measurements and ends method .Construction types, methods of uses & care while using the falling tools- scribes, Dividers, Calipers, Steel rule, Try square, centre punch, Dot punch , Hammers, surface, V –Blocks , Marking of frame, Hacksaw blade, chisels, Files, Angle, Plates, Parallel block blocks, C- clamp & Parallel clamp.

2) Types of files, file care & its use, Convexity of files, proper No. of strokes per minute for steady and accurate filing, Filing technique .

3) Types of chisel, Material of chisel correct length and cutting angle of chisel Method of chipping ,, grinding of chisels.

4) Drilling -- types of Drills. Types of drilling Machines – bench and pillar types.

5) vernier Calipers - Principle, construction, Graduation, reading use care and adjustment .

Vernier height gauge—construction, parts, use and care.

Combination set, Vernier bevel Protractor, Dial indicators,

Depth gauge, Radius gauge, Feeler gauge.

Tapes, sizes of taps, tapping blind holes, lubricants for tapping , causes of broken tapes, removing a broken tap from hole.

6) Tap wrenches, construction , standard dimensions, Tapping blind holes, Determination of size of drills for tapping standard holes.

External threading – Dies.

Different fastening & locking devices.

**B. WELDING -- THEORY**

1) Importance of safety and General precautions to be observed in the section and first aid.

2) Description and use of tools and equipments used in the trade.

3) Different process of metal jointing such as soldering and Brazing. AC/DC Types of Electric Welding and their application. Principle of ARC welding. Necessity of welding machine. Types of Welding machine and their construction. Care and Maintenance of Welding machines.

Common Gases used for welding. Types of Flames, Flux used in Arc & Gas wilding as per I . S. Specification, Constructural details of Blow pipe.

4) Electrodes Regulators types used in welding operation. Current Setting of Electrodes.

5) Welding positions in Arc & Gas welding .Gas cutting procedure.

### **C. PLUMBING - THEORY**

- 1) Importance of trade machinery used, Types of work done by student, Introduction to safety precaution, Elementary first Aid. Description of plumbers tools and equipments, plumbing symbols. Care use of tools.
- 2) Pipes - different kinds- Pipe fitting bends, elbows sockets tees, Unions, etc. their description and use. Method of jointing, their uses, Description of different joints. P.V.C. description.
- 3) Use of hume and asbestos pipes of different size. Method of laying out pipes alignment and jointing. Description of pipes dies, their use, care and precautions. Standard pipe threads.
- 4) Bending Machine & Method of bending their advantage and disadvantage.
- 5) Renewal of the valve & pipe correct process of dismantling and reconding. Leak in pipes and noise in plumbing.
- 6) Types of the joint used for different material such as zinc, copper, Lead, etc. way of bending lead pipes, precautions.

### **PRACTICAL – I, PLUMBING**

- 1) Introductory demonstration to observe safety while handling tools and Equipments.
- 2) Drilling- Tapping & Threading on pipes. **(M.S.& C. I. Pipes )**
- 3) Pipe cutting of different metals of different size with reducing fitting.
- 4) Practice of cutting pipe at different angle for different joints.
- 5) Preparation and fixing of G. I. Pipe for hot and cold services to the bath and wash basin as per layout.
- 6) Erecting PVC Pipe fitting to water spraying system.

## **PRACTICAL – II, FITTING AND WELDING**

### **A. FITTING -- PRACTICAL 2**

- 1) Marking out scribing of lines, location of position of holes.
- 2) Marking out lines by parallel edges, surface gauge vee –Block
- 3) Filing flat and square to the faces, sawing along the line
- 4) Simple fitting.
- 5) Sawing, Filing, Chamfering and radius forming  
Drilling to given tolerance, counter sink and counter Drilling 6)
- 7) Radius fitting job. Marking out to dimensions with height gauge, sawing, chamfering and radius forming.
- 8) Marking out with combination set and height gauge. Use of Vernier bevel protractor,
- 9) Tapping & Dieing.

### **B. WELDER.**

**Introductory** demonstration to observe safety while handling tools and equipments.  
**In welding shop.**

- 1) Straight line Heads ( D.H.P.) on M. S. Plate by Arc
- 2) Fillet weld in ( D.H.P.) & Vertical (upward) Position by Arc
- 3) Open Corner joint ( D.H.P.) On M.S. Plate by Arc.
- 4) Single ‘V’ Butt Joint ( D.H.P.) On M.S. Plate by Arc.
- 5) Oxyacetylene cutting straight , Bevel Free hand
- 6) Fusion run with and without filler rod position F by Gas
- 7) Square Dust Joint , S. Position F by Gas
- 7) out side Corner Joint V. P. on M. S. By Gas.
- 9) Fillet lap joint V.P. ON M.S. BY Arc
- 10) Fillet ‘ T ’ joint O.H.P.
- 11) Pipe Butt joint position OHP by gas
- 12) Butt Welds O.H. position by Arc.
- 13) Brazing of Copper to Brass tube by Gas.

**List of Equipment- FITTING**

Sr. No.	Name of the Article	Qty Required
1.	Sensible drill press 12 mm. capacity bench type with machine Vice & chuck	1
2.	Bench Grinder double ended self- drive 200 mm. die wheel.	1
3.	Fitter Bench vice parallel 100mm. Jaws	5
4.	Tap and Die set courses fine range 5mm. to 15 mm.	1
5.	Adjustable Pipe range 250 to 300 mm.	1
6.	Hammers 225 gms. ball pein	2
7.	Cool steel round nose and Dimond Point Chisel (100mm. x 7 mm )	2
7.	Stainless steel rule 150 mm.	5
9.	File II cal & smooth 250 mm.	5
10.	Half round II cal & smooth 250	5
11.	Triangular II cal smooth 200 mm.	5
12.	Square II cal. 250 mm. x 10 mm	5
13.	Cast steel flat and cross cal chisel 200 mm x 7 mm	4
14.	Engineers Trysqyare 100 mm	4
15.	Centre Punch 75 to 100 mm.	4
7.	Caliper ( Inside & Outside ) spring joints.	4
7.	Hack Saw frame adjustable 250 to 300 m.	10
17.	Screw driver 250 to 300 mm	2
19.	Surface plate 450 x 450 mm. with stand	1
20.	' V ' Blocks	1
21.	Marking Block Universal	1
22.	Fitter Table 15000 x 900 x 750	1
23.	Table for Grinder and Drill Press	01
24.	Pipe Vice	01
25.	Twist Drill s/s. bits assorted straight shank 1.5 mm to 12mm	1set
26.	Twist Drill S/S 2 mm to 12 mm ½ m.	1set
27.	Angle plate 150 x 100 x 100 mm	1
27.	Steel Cupboard - 1700 x 100 x 450	1
29.	Drill chuck 12 mm. capacity	1
30.	Adjustable spanner 150 mm.	1
31.	Spanner set W/W 6 mm. to 25 mm. set of 7	01
32.	Table for Instructor	1
33.	chairs	2
34.	Black Board	1
35.	First Aid Box	1
36.	Card file set	1
37.	Bearing Puller	1
37.	Height Gauge	1
39.	Combination set square	1
40.	Oil Can	2
41.	Vernier Caliper 200 mm.	1
42.	O/S micrometer to 25 and 25 to 50	2
43.	Set of measuring instruments as per syllabus	1

	( precision )	
44.	Chain wrench 1000 mm.	1
45.	Power Saw backsaw machine.	1

### **LIST OF TOOLS AND EQUIPMENTS -- Welder**

Sr. No.	Trainees Kit.	Qty Required
1.	Gloves pair Leather	10
2.	Apron Leather	10
3.	Screen welding Hemlet type	4
4.	Screen welding Hand	4
5.	Goggle pair welder	4
6.	Hammer sealing 0.25 kg with hand	4
7.	Chisel cold flat 19 mm.	4
7.	Centre punch 9 mm. x 127 mm.	4
9.	Dividers 20 cm.	4
10.	Caliper out side	4
11.	Rule- 60 cm to fold brass tipped to read Inch's and mm.	5
12.	Wire Brush 15 cm. x 3.7 cm.	4
13.	Span lighter	2
14.	Safety Boots for Welder	5
15.	Safety Goggle	5
7.	Square Blade 15 cm.	4
7.	scriber 15 cm.	5
17.	Tong Floding 30 cm.	5
19.	Hammer Ball pen 1 Kg.	4
20.	Chisel cold cross 9 mm.	4
21.	Screw driver 25 cm & 20 cm.	2
22.	Number punch 6 mm. and Letter punch cm.	2
23.	Manifying glass 15 cm.	2
24.	Weld measuring gauge fillet & Ball	1
25.	Vice hand 10 cm.	2
26.	File flat 35 cm rough	3
27.	File half round bastard 30 cm.	3
27.	Spanner 12 mm. and 15 mm. double ended	4
29.	Spanner D.E. 6 mm. to 15 mm. by 1.5 mm. (set of Nos.)	1 set
30.	Clamps 'C' 10 cm. 15 cm. 30 cm.	2 each
31.	Hammer sledge double feed 3 kg.	1
32.	Pipe wrench 25 cm and 35 cm.	1 each
33.	Steel taper 172 cm. flexible in case	2
34.	Welding torcher with 5 to 10 Nozzle.	2 sets.
35.	Earth Clamp.	2
36.	Electrode holder (Should have capacity up to 400 amps )	4
37.	Welding rubber hose oxygen and acetylene 7 mm.	20 Mel.
37.	Rubber hose clip	20 Mel.
39.	Spindle Key ( for opening Cylinder Valve)	02
40.	Pressure regulator oxygen	02
41.	Pressure regulator acetylene	02
42.	Tip cleaner	2 set
43.	Glasses coloured 107 mm. x 72 mm.	5 Nos.

44.	Glasses 107 mm. x 71 mm. white.	5 Nos.
45.	Out fit Spanner	4 Nos.
46.	Transformer welding Air Cooled 200 – 300 Amps.	2 set.
47.	Arc welding set rectifier type 200 - 300 Amps. Continuous welding current with all accessories.	1 set.
47.	Welding cable to carry 350 amps with flexible Rubber.	20 meter
49.	Luge for cables	10 Nos .
50.	Gas welding table fire bricked on stand 172 x 92 x 600 cm with positioner.	4
51.	Rubber hose pipe black and red 4 mm.	20 meter
52.	Trolley for cylinder	1
53.	D .E . Grinder 30 cm wheel motorized pedestal type.	1
54.	Vice Bench 10 cm Jaw	4
55.	Metal kach 172 cm x 152 cm x 45 cm	1
56.	Fire Buckets with stand	3
57.	Arc welding table all metal with positioned 122 cm x 92 cm x 60 cm	2
57.	Fire extinguishers ( From type and co type )	2
59.	Instructor Desk	1
60.	Chair	1
61.	Black Board with case	1
62.	First Aid Box	1
63.	Welding Halmets.	3 Nos.

#### **LIST OF TOOLS & EQUIPMENTS. -- PLUMBING**

Sr. NO.	Item	Qty Required
1.	Steel Rule 300 mm. both in inch & mm.	5 Nos.
2.	Rule Wooden 4 fold 600 mm.	5 Nos.
3.	Hack- Saw frame adjustment 250 m. mt. 300 mm.	4 Nos.
4.	Hammer ball pein 700 gms.	4 Nos.
5.	Hammer ball pein 50 gms.	4 Nos.
6.	File flat rough 300 mm.	5 Nos.
7.	Level sprit wooden 300 mm.	4 Nos.
7.	Stillson wrench 200 mm. 350 mm	2 Nos.
9.	Screw Driver 250 mm.	4 Nos.
10.	Wooden mattlet small IS 2022	4 Nos.
11.	Cutting pliers 200 IS 3650	4 Nos.
12.	Steel and taper	2 Nos.
13.	Bench vice Jaw 100 mm.	2 Nos.
14.	Tap & dia set to cal B . S.F. B. S. and metric thds of sizes No.6 to 12	1 Set
15.	Screw pitch gauge	1 Set
7.	Screw plumber 300 mm.	2 Nos.
7.	Spanner Morkury up to 50 mm.	2 Nos.
17.	Stove melting solder	1 Nos.
19.	Pipe Joiner fead, universal	1 Nos.
20.	Try square 200 mm.	3 Nos.
21.	Inside caliper 150 mm.	2 Nos.
22.	Outside caliper 150 mm.	2 Nos.
23.	Odd Caliper 200 mm.	2 Nos.

24.	Brush steel wire 150 x 50 mm.	1 No.
25.	Plier combination 200 mm.	2 Nos.
26.	Blow lamps 500 mililitre	2 Nos
27.	Pipe opener	1 No.
27.	Washer Caller	1 No.
29.	Plumber Kit containing Tam pin Bent pin	1 No.
30.	D spanners 7 x 7, 10 x 12, 13 x 7, 19 x 22, 24 x 27, IS 2027	1 Set.
31.	Bending spring	1 Set.
32.	Pipe stocks and dies complete with sticks Brushing Pushing holder Tam and Tap Wrencher sires covered to suit pipe of bore dia 6, 7, 10, 20, 25, 32, 40, & 50	2 Set.
33.	Pipe vice to grip pipe upto 27 mm.	2 Nos.
34.	Chain pipe wrench mm.	1 No.
35.	Adjustable Spanner	1 No.
36.	Pipe Bender manually operated	1 No.
37.	Working Bench 2400 x 1200 x 750 mm. 125 mm, Jaw with 4 vice.	1 No.
37.	Story tap water 20 mm. IS 771	3 Nos.
39.	Wash Basin 7" x 14" x 10" )	2 Nos.
40.	Water closer ( Indian type )	1 Set.
41.	Water meter	1 No.
42.	Metal rack ( 1500 x 450 mm. )	1 No.
43.	Desk	1 No.
44.	Stool	1 No.
45.	Black Board	1 No.
46.	Fire Extinguisher	1 No.
47.	Bar bending m/c with bard bending table.	1 No

## Reference Books :-

1)Turner Theory :- M.B.Dandgavhal

2) Fitter theory :- M.B.Dandgavhal

3) Welder Theory:- M.B.Dandgavhal

4)Plumbing :- Townsend A.L

5) Plumbing :- Philbin

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