

3

Loy Day

# GOVERNMENT OF TAMIL NADU

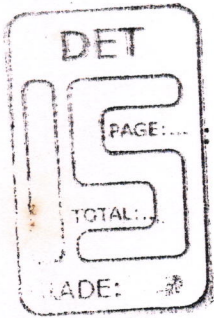
INDUSTRIAL SCHOOL COMMON SYLLABUS FOR THE TRADE OF  
MARINE DIESEL MECHANIC (M.D.M)

## Syllabus formation committee

President

: Er.K.PANEER SELVAM M.E., Avl.,  
Regional Joint Director (Training),  
Tirunelveli.

Members



1.Mr.V.S.GANESAN,  
Correspondent, Jeyanthinather I.T.I.,  
Thisaiyanvilai.

2.Er.S.VIJAYANAND M.E.,  
Lecturer, Govt., Eng., College, Tirunelveli.

3.Er.RAJESH SHYAMALA DEVI B.E.,  
Lecturer, Govt., Eng., College, Tirunelveli.

4.C.PRABAKHAR D.M.E.,  
Lecturer,  
Jeyaraj Annapackiam C.S.I Polytechnic, Nazerath.

5. Er.D.S.M.SUDHAHAR D.M.E., B.E.,  
Vice Principal,  
Jeyanthinather I.T.I.,  
Thisaiyanvilai.

Checked & Verified By

: 1.Mr.SAJAN, DME., BA.,  
Rtd., Marine Engineer, Sub Mariner, Indian Navy.

2.Er.D.SAMUEL SUNDER SINGH B.E.,  
J.T.O, BSNL, Agartala.

DURATION

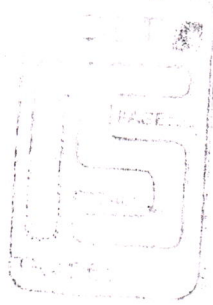
: 1 year.

# Government of Tamil Nadu

## Industrial School common syllabus for the Trade of Marine Diesel Mechanic

Duration : 1 year ( 52 Weeks)

Qualification : 10<sup>th</sup> Standard



*[Handwritten signature]*

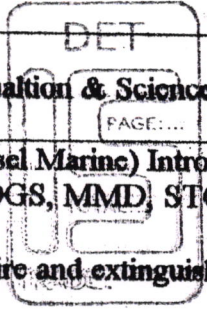
Checked & verified  
Retired Marine Engineer,  
Sub Marine,  
Indian Navy.

*[Handwritten signature]*

Checked & Verified  
D. Saraswathi Srinivas Singh  
JTO, BSNL - Agarstala.

**COURSE DETAILS**

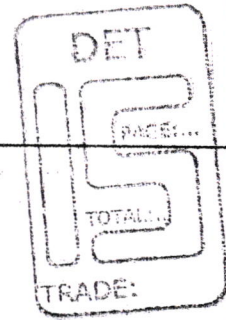
<b>Name of Trade</b>	<b>: MARINE DIESEL MECHANIC</b>
<b>Qualification</b>	<b>: 10<sup>TH</sup> PASS / FAIL</b>
<b>Age</b>	<b>: 14-40 Years</b>
<b>Duration</b>	<b>: 1 Year</b>
<b>Number of Trainees</b>	<b>: 20</b>
<b>Number of Practical hours</b>	<b>: 32 hrs. per week</b>
<b>Number of Theory Hours</b>	<b>: 8 hrs. per week</b>
<b>Number of Workshop Calculation hours</b>	<b>: 2 hrs. per week.</b>
<b>Number of Engineering Drawing hours</b>	<b>: 2 hrs. per week</b>
<b>Space Required</b>	
<b>Workshop</b>	<b>: 400sq. feet</b>
<b>ClassRoom</b>	<b>: 200 sq. feet</b>
<b>Power Required in KW</b>	<b>: 2 k.w.</b>



Weak No.	Theory (Including W/s. Calculation & Science and Eng., Dra.,)	Allotted Time (Hours)
1	a) Introduction about trade (Mech. Diesel Marine) Introduction about shipping industry. Introduction about Imo, DGS, MMD, STCW convention. b) Safety training Safety rules – safety precautions – fire and extinguish method – First Aid – Accident and their courses.	8
2	Layout plan of engine room – location of various equipment in the engine room – double bottom structure & tank – wing tank – settling tank, day tank – coffer dam – various pump and their functions – piping arrangement.	8
3	Exhaust gas boiler – purifies – heat exchangers – fresh water generator- Oil bilge seperator – hydro phone system – controllable pitch propeller – refrigeration system – air compressors.	6
	<u>Engineering drawing</u> Introduction to engineering drawing and blue print reading – free hand sketch of straight lines – rectangles – square and circles. <u>W/S. Calculation</u> Simple working problem involving addition, subtraction, multiplication and division of whole numbers.	1  1
4	Principle of electricity – electric generation – motors – circuit – breaker fuses – starters – fire fighting equipment – quick closing valves – boiler switches.	6
	<u>Engineering drawing</u> Sketching of circles – rectangles – squares – parallelograms – rhombus – polygons. <u>W/S. Calculation</u> Common fraction – types of fraction – conversion of fraction into decimal.	1  1
5	Emergency procedure in engine room for event of fire – turbo chanrger – propulsion engine – auxiliary engine – steering gear.	6
	<u>Engineering drawing</u> Reading of simple blue prints sketching of simple solids cubes – rectangular blocks – cylinder. <u>W/S. Calculation</u> Metals – classification – properties – manufacturing of pig iron, cast iron & wrought iron.	1  1
6	Emergency equipment – emergency battery & generator- emergency escapes in the engine room.	6
	<u>Engineering drawing</u> Hexagon – pentagon-ellipse – parabola – Hyperbola – Involute. <u>W/S. Calculation</u> Steel – ferrous metal – Non ferrous – alloy metal – ferrous alloy.	1  1
7	Engine room watch keeper for various function – water level in expansion tanks – main engine cylinder head for abnormal sounds and vibration – crank case – lubricating oil pump.	6
	<u>Engineering drawing</u> Nuts – Bolts – Studs with dimension. <u>W/S. Calculation</u> Timber – leather – plastic – rubber.	1  1
8	Running generators – various gauges – pressure gauge – temperature gauge – motor amperage – water level gauge	6
	<u>Engineering drawing</u> Views of solid bodies – square block – rectangular block – hollow cylinder links – cones. <u>W/S. Calculation</u> Units – length – area – volume – weight.	1  1

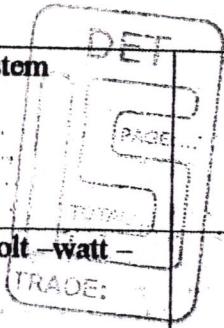
9	Various pump – compressor – air bottles – lubricating oil system – cooling water system – remote gauges – pressure tank level on board the ship. <u>Eng., Dra.,</u>	6
	Rivets – washers with dimensions. <u>W/S, Cal. &amp; Sci.,</u>	1
	Power – temperature – pressure – angle	1
10	Different types of valves – fire water system – ballast system <u>Eng., Dra.,</u>	6
	Ortho graphic projection . <u>W/S. Cal. &amp; Sci.</u>	1
	Heat treatment- Annealing – critical temperature – Normalising	1
11	Engien room log book – operations. <u>Eng. Dra.,</u>	6
	Orthographic pprojection 4 stroke – 2 stroke cycles. <u>W/S. Cal., &amp; Sci.,</u>	1
	Hardening – tempering	1
12	Climbing down the engine room stair case – shoes – working cloth – helmet – ear muff – torch <u>Eng., Dra.,</u>	6
	Orthographic projection in 3rd angle. <u>W/s. Cal., &amp; Sci.,</u>	1
	Square root problemes.	1
13	Ship visit – Marking tools <u>Eng. Dra.,</u>	6
	Valves – spring, Valve asssembly with dimension <u>W/s. Cal., &amp; Sci.,</u>	1
	Square root problemes.	1
14	Marking table – measuring tools <u>Eng. Dra.,</u>	6
	Hollow bodies – with dimension <u>W/S. Sci., &amp; Cal.,</u>	1
	Precentage to decimal	1
15	Tools Hacksaw tool – File – chisel – screw driver – plier <u>Eng. Dra.,</u>	6
	Isometric view of objects – square rectangle – cubes. <u>W/s. Cal., &amp; Sci.,</u>	1
	Fraction to percentage.	1
16	Spanner – gauges – template – sheet metal work <u>Eng., Dra.,</u>	6
	Piston gauges – pin rings, conaection rod with dimension. <u>W/S. Cal., Sci.</u>	1
	Heat and temperature.	1
17	Lathe – drilling – shapping – grinding <u>Eng., Dra.</u>	6
	Crank shaft – fly wheel with dimension <u>W/s. Sci., &amp; Cal.,</u>	1
	Thermometer – byro meter – specific heat	1
18	Welding Machine – steering fuel injector test equipment <u>Eng., Dra.,</u>	6
	Cylinder block – cylinder head <u>W/s. Cal., &amp; Sci.,</u>	1
	Expansion due to heat – latent heat of fusion.	1
19	Thermo dynamic cycle – Otto cycle – diesel cycle <u>Eng. Dra.,</u>	6
	Pearing with dimension.	1

20	Engine structure – general terms regarding in engine Eng., Dra.,	6
	Oil filters and pumps – coolers with dimension W/S. Cal., & Sci.,	1
	Mechanical Equilavalent to heat – transmission of heat	1
21	External & Internal Combustion engine cycle of operation Eng., Dra.,	6
	- do - W/S. Cal. & Sci.	1
	Ratio and proportion – exercise	1
22	Types of ignition arrangements of cylinders, valves Eng., Dra.,	6
	Torque wrinches, W/S. Sci., & Cal.,	1
	Direct proportion – inverse proportion	1
23	Machinery and engine room – major parts of IC Engine Eng., Dra.,	6
	Cylinder liners W/S. Sci., Cal.,	1
	Dynamics – speed – velocity – Uniform velocity	1
24	Nautical terms used in ships Eng., Dra.,	6
	Water pump – Thermo static valve – cylinder block W/S. Cal., & Sci.,	1
	Equations of motions laws and Newton laws	1
25	Diesel engine – 2 stroke engine – petrol engine – 4 stroke engine – turbo charging Eng. Dra.,	6
	-do- W/S. Cal., & Sci.,	1
	Algebra – removing brackets	1
26	Cylinder block & head – piston rings – piston pin Eng., Dra.,	6
	2 stroke & 4 stroke valve timing diagram W/S. Sci., & Cal.,	1
	Problems using in algebra formulas.	1
27	Crank shaft – connecting rod – timing gear – valve timing Eng., Draw.,	6
	Parts of and engine W/s. Cal., & sci.,	1
	Work power and energy	1
28	a)Ship visits & Plant visits b)Ship training in raider dock.	8
29	Fuel feed system – compusiton champer – diesel feed system – nozzle. Eng., Dra.,	6
	View of solid and hollow bodies cut section plan	2
30	Fuel injection pump – inline type – distributor type – fuel filter W/S. Sci., & Cal.,	6
	Logarithm & formulas	2
31	Cooling system – in marine diesel hip engines Eng., Dra.,	6
	Practice in blue print reading W/S. Sci., & Cal.,	1
	System of forces.	1



32	Air cooling in marine diesel ship engines – Sea water cooling – radiator cooling – keel cool method	6
	Eng. Dra.,	1
	-do- W/S. Cal., & Sci., Moment of force	1
33	Governor – Mechanical & pneumatic governor	6
	Eng. Dra.,	1
	Engine mountings	1
	W/S. Sci., & Cal., Simple machines	1
34	Porter – proclt governor	6
	Eng., Dra.,	1
	Water Seperator	1
	W/S. Sci., & cAl., Mesuration	1
35	Lubrication system – petro oil – splash	6
	Eng., Dra.,	1
	-do- W/S. Cal., Sci. Cube – cubid – prissoms	1
36	Oil pumps – gear & rotor pump	6
	Eng., Dra.,	1
	Fuel feed system	1
	W/S. Sci., & cAl., Friction	1
37	Staring system	6
	Eng., Drw.,	1
	-do- W/S. sci. & cal., Trigonometry	1
		1
38	Rudder	6
	Eng. Dra.,	1
	Fule injection pump	1
	W/S. sci., & Cal., -d0-	1
39	Steering – shafting – propeller shaft	6
	Eng., Dra.,	1
	-do- W/S. Sci., & Cal., Graph excercises	1
		1
40	Propeller	6
	Eng., Dra.,	1
	Feed pump – lettering and numbering	1
	W/S. Cal., & Sci., Strength of materials	1
41	Air conditioning system	6
	Eng., Dra.,	1
	-do- W/S. cal., & Sci., Elastic limit – ultimate stress	1
		1
42	Equipment used in Air Conditioning	6
	Eng., Dra.,	1
	Pneumatic governor with dimensions W/S. Cal., & Sci.,	1

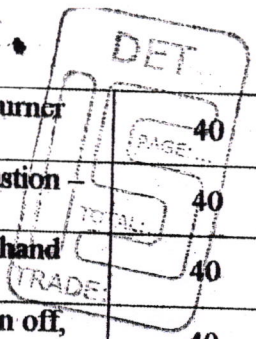
43	<p>Classification – purpose and arrangement – Ship air conditioning system  <u>Eng., Dra.,</u>                  Mechanical governor  <u>W/S. Sci., &amp; Cal.,</u>                  Estimation</p>	<p>6 1 1</p>
44	<p>Electric current – direct and alternate current- Potential differents – volt – watt – ohm switch – fuse.  <u>Eng., Dra.,</u>                  Different size of nozzles  <u>W/S. Sci., &amp; Cal.,</u>                  Hydro statics</p>	<p>6 1 1</p>
45	<p>Conductor – Insulator – battery- Constant current method – constant potential method- Starting motor – charging system  <u>Eng. Dra.,</u>                  -do-  <u>W/S. sci., &amp; cal.,</u>                  -do-</p>	<p>6 1 1</p>
46	<p>DC generator or Dynamo – Alternator- regulator  <u>Eng., Dra.,</u>                  Free hand sketch of grease gun  <u>W/S. Cal., &amp; Sci.,</u>                  Hydro meter</p>	<p>6 1 1</p>
47	<p>Fire and damage control – first aid – fire &amp; causes of fire- preventing awareness  <u>Eng., Dra.,</u>                  Blue print reading of an engine  <u>W/S. sci., &amp; Cal.,</u>                  Pascals law – atmospheric pressure</p>	<p>6 1 1</p>
48	<p>Fire fighting &amp; its first aid  <u>Eng., Dra.,</u>                  Lubrication, Ignition, Cooling system  <u>W/S. Sci., &amp; Cal.,</u>                  Electricity – magnitism.</p>	<p>6 1 1</p>
49	<p>Drills and Emergenct in engine room – awareness in engine room  <u>Eng., Dra.,</u>                  Starter motor circuit to engine  <u>W/S. Sci., &amp; cal.,</u>                  Atoms and molecules</p>	<p>6 1 1</p>
50	<p>Scamen ship – Nautical terms – different hinds of nauts – regging – prefaring deck of sea.  <u>Eng., Dra.,</u>                  Solinoid switch  <u>W/s.Sci., &amp; Cal.,</u>                  Proton – Electron – Neutron</p>	<p>6 1 1</p>
51	<p>Repair and maintenance of engine  <u>Eng., Dra.,</u>                  Ship structures of 3 views.  <u>W/S. Sci., &amp; Cal.,</u>                  -do-</p>	<p>6 1 1</p>
52	<p>Revision</p>	<p>8</p>



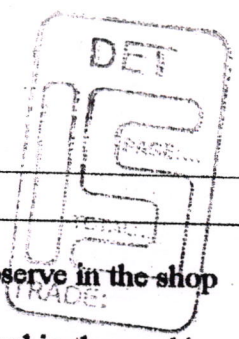


Week No	Practical	Allotted Time (Hours)
1	To familiar institute importance safety precautions. Safety equipments and workshop tools. To familiar with fitter hand tools.	40
2	Cleaning of commutators. Repairing of fuel pipe lines – for leaks checking fuel tank for leaks	40
3	Dismantle and assemble engine complete clean and pressure test cylinder block and cylinder head test cylinder block and head for working.	40
4	Test cam follower bores – test and fit rocker arm shaft with new bushes – remove and refit valve seat inserts it necessary – remove and refit valve guides.	40
5	Cut / grind valve seats to correct angles – reface valves – lap valves on their seats.	40
6	Check crank shaft and cam shaft bearing for wear – test connecting rod for twist and bend – chuck, clean and refit piston rings in the ring grooves – remove., clean, chuck and refit gudgeon pins and bushes – chuck big and bearings – check alignment of bearings.	40
7	Check oil passages in the crank shaft and engine block and clean – over haul oil pump and oil filters – measuring cylinder bores and chart the readings – measure cylinder bores and torque main bearings with torque wrench.	40
8	Measure crank pins and main journals – assemble piston and connecting rod assemple in cylinder block – assembly head and valve assembly – check and adjust valve timing – adjust tappet clearance,	40
9	Replace timing cover oil seal and fit timing cover to block – assemble oil pump, oil filter and pump – fit glow plugs – start engine and adjust slow speed.	40
10	Remove gear box assembly and clutch assembly from engine – dismantle clutch pressure plate – reline the clutch plate.	40
11	Dismantle the stern gear over haul and refit – replace clutch shaft pilot bearing in fly wheel and test for sum out Dismantle, clean inspect and reasonable gear box.	40
12	Dismantle, clean, and refit primary fuel filters with replacement elements – dismantle, clean, inspect, reasonable and fit transfer pumps.	40
13	Over hawl injection pumps – phase & calibrate F.I pump – remove, clean, replace filter elements and fit fuel filters. Bleed air from fuel supply system.	40
14	Lubricating oil and fill in fresh oil – remove, clean oil filters – replace filter element and refit on engine.	40
15	Over hawl oil pumps – check and adjust the oil pressure relief valv – remove, clean and refit oil coolers.	40
16	Reverse flush cooling system – fit sea water cooling system – dismantle and assemble fresh water cooling – remove test and fir thermostats – over hawl water pumps.	40
17	Practice in use of manufactures hand tools – over hawling auxiliary engine – maintenance of air compressor – over hawling of twin fuel system.	40
18	Over hawling of compressirs – check up wear in hand starter equipment – remove – cleand and reasonable and fit electric starter motors.	40
19	Remove clean and refit Air filter – over hawling of air intake system – remove, clean and refit inlet and exhaust mani folds.	40
20	Remove, clean, and refit exhaust pipes and chimney – checking leaks in manifold joints and fitting new gaskets.	40
21	Precautions for cross – blowing the gauge glass – maintain the water level in the boiler – how to read boiler pressure correctly.	40

DEF  
Allotted Time (Hours)  
TOTAL 40  
PAGE: 40



22	Check and clean fuel system of boiler – start the burner – clean the burner tip of carbon deposits.	40
23	Flame colour inside the combustion chamber, to assist proper combustion procedure for dismantling blowing down of a boiler.	40
24	Precaution taken to prevent oil leakage from boiler and function of hand box, kept near boiler.	40
25	Automatic mode of lighting burners. What all to watch when burner in off, shut off of burner and restart.	40
26	Duty as per emergency plan on board the ship – location of the various quick closing valves for engine room	40
27	Engine used for propulsion of the ship main engine – gas turbine assembling.	40
28	a) Ship visit and plant visits. b) Ship training in raider dock.	40
29	Acquaintance with normal operation sound of main engine – an usual sound noise.	40
30	Heat exchangers in cooling water system – pumps motor starters.	40
31	Remove, clean, top up and test and refit battery – remove, dismantle, clean, assemble and test dynamo.	40
32	Overhaul starter motor assembly – diagnose faults in electrical system – maintenance of electrical system.	40
33	Repair and maintenance of sea water pumps.	40
34	Overhauling of bilge pump – sea lock	40
35	Overhauling of winch system.	40
36	Overhauling of steering system.	40
37	Diagnosis of faults and correcting them	40
38	Regular periodical maintenance	40
39	A/C compressor dismantling and assembling	40
40	Cutting gasket of compressor – assembly of compressor parts.	40
41	Dismantling of hermetic compressor checking and servicing of components.	40
42	Dismantling of semi – rotary compressor.	40
43	Study of centrifugal and screw type compressor – checking and servicing of components/	40
44	Servicing air cooled condenser – liquid receiver – checking leak repair and testing.	40
45	Checking automatic and thermostatic expansion – valves and capillary tube – servicing and testing.	40
46	Overhauling A/C plants remove the failure parts.	40
47	Engine room 15 min before start watch and check all running machineries and then report to the maintenance keeper.	40
48	Emergency procedures for engine room in the event of fire.	40
49	To escape from the engine room in emergency.	40
50	To make a event in life saving appliances.	40
51.	Procedure for emergency to stop the engine.	40
52.	Revision.	40



**Achievements Expected**

S.No.	Name of the work	Acheivements Expected
1	Introduction and safety training	a) Scope of trade – Mechanic (Diesel) b) Safety precautions and safety rules to be observe in the shop floor. c) Disciplinary rules and communication channel in the working area.
2	Allied trade work fitting and sheet metal	a) Ability to fire surface and make them <i>flat</i> b) Ability to mark and punch c) Ability to use hacksaw, drill reamer, taps and dies. d) Ability to make simple sheet joints and soldering c) Ability to bend pipes.
3	Engine repair work	a) Ability to remove jammed bolts, nuts nad prepare maintenance schedule. b) Ability to start and stop diesel engine and observe its performance. c) Ability to test compression and vaccum and analyse the results. d) Ability to torque wrenches, remmove the cylinder head, decentonied refit e) Ability to measure bore, piston, ring clearance bearing cleatance, crank shaft main journal, crank pin journal and filter frudics. f) Ability to over hawl oil filters, oil coolers, oil pump. Water pump, thermos tate valves. g) Ability to fit new shell nearings in main and connecting rod and set bearing. h) Ability to set timing of fuel injection pump. i) Diagonose engine noises of different nad rectifying. JICooling system faults in lubrication.
4	Engine Erection work.	Ability to erect diesel engine on foundation.
5	Fuel Injection system work.	a) Ability to repair leaks of diesel oil and air lock in fuel lines and bleed air from the system. b) Ability to follow safety precautions while doing the above work. c) Ability to adjust slow speed and maximum speed in the venture contrl unit d) Ability to test functioning of pnumatic and mechanical governor e) Ability to check and adjust injector on test f) Over hawl filters and bleed them.
6	Repair of shop floor equipment.	Ability to repair and maintanance equipments and instruments using for repairing diesel engines.
7	Electrical repair work	a) Ability to do simple repairs in the ignition, charging, and starting circuits b) Ability to do repair dynamo, self motor, alternator and other accessories.

**INDUSTRIAL SCHOOLS**

**TRADE SYLLABUS – REVISED**

**Name of the Trade** : **MARINE DIESEL MECHANIC (M.D.M)**

**SPACE REQUIRED** :

**(1) Workshop/Lab** : 600 sq. ft.

**(2) Class Room** : 200 sq. ft.

**Trade Theory** : No change

**Trade Practical** : No change

**Engineering Drawing** : No change

**Workshop Calculation** : No change

**List of Tools & Equipments**

**For The Trade of MARINE DIESEL MECHANIC (M.D.M)**

**FOR A BATCH OF 20 TRAINEES**

**TOOL KIT**

<b>Sl. No.</b>	<b>Name of the item</b>	<b>Quantity Revised</b>
1	Rule Steel 15cm with Metric Graduations	5
2	Square try 10cm Blade	5
3	Caliper Outside 15cm spring	5
4	Caliper Inside 15cm Spring	5
5	Caliper 15cm Hermachrodite	5
6	Divider 15 Spring	5
7	Scriber 15cm Spring	5
8	Punch Centre 10cm	5
9	Screw Driver 15cm	5
10	Chisel Cold 10	5
11	Hammer Ball Pein 0.4kg with handle	5
12	Hammer Ball pein 0.22kg with handle	5
13	File flat 25cm second cut	5
14	File flat 25cm smooth	5
15	File Half round Second cut	5
16	Hacksaw frame Adjustable 20-30cm	5
17	Safety Goggles	5
18	Dot Slot Punch	5

General Tools & Instruments		
19	Rule steel 30 to read metric	3
20	Rule steel 60cm	2
21	Straight Edge 45cm	1
22	File knife edge 15cm smooth	1
23	File cut saw 15cm smooth	1
24	File feather 15cm smooth	1
25	File triangular 15cm smooth	1
26	File round 20cm second cut	1
27	File square 25cm second cut	1
28	File square 25cm second cut	1
29	Feeler gauge 10 blades	1
30	File triangular 20cm second cut	1
31	File flat 30cm second cut	1
32	File flat 20cm bastard	1
33	File flat 30cm bastard	1
34	File swiss type needle set of 12	1
35	File half round 25cm second cut	1
36	File half round 25cm bastard	1
37	File round 30cm bastard	1
38	File hand 15cm second cut	1
39	Card file	1
40	Stone oil 15cmx5cmx2.5cm	1
41	Stone carborandum 15cmx5cmx5cmx4cm	1
42	Can oil 0.25 litres	1
43	Plier combination 15cm	1
44	Iron soldering 350cm.,	1
45	Lamp blow – 0.55 Litres	1
46	Spanner adjustable 15cm	1
47	Interchangeable ratchet socket set with a 12mm driver-socket range 4mm set of 8	1
48	Micrometer 50-75mm outside	1
49	Micrometer inside 25mm 50mm with extension rods	1
50	Vernier caliper 20cm	1
51	Pipe wrench 40cm	1
52	Pipe vice No.4	1
53	Adjustable pipe die 0-20cm cap	1
54	Wheel dresser (One for 4 units)	1
55	Machine vice 15cm	1
56	Anvil 50kg on stand	1
57	Drilling machine bench sensitive 0-12mm cap motorized with chuck and key	1
58	Forge portable hand bowler 38cm to 48cm	1
59	Grinding machine (General purpose) D.E pedestal with 20cm dia wheels ruf and smooth with twist drill grinding attachment	1

60	Pipe stock and dies complete with stocks, bushing, bushing holders tab and wrenches sizes covered 6mm, 9mm, 12mm, 19mm, 25mm, 32mm, 38mm, 50mm.	1
61	Pipe bender spool type with stand manually operated	1
62	Adjustable spanner 38cm long	1
63	Adjustable pipe chain tonge 22cm long to take pipes from 3cm to 63cm.	1
64	Depth micrometer 0-100mm 0.01mm	1
65	Comparator stand with dial indicator	1
66	Engineers try square (Knife edge)	1
67	Lugs for cable	1
68	Spanner D.E set of 12 metric 8.32mm(set of 20)	1 set
69	Screw driver 30cm x 9mm blade	1set
70	Screw driver 20cm x 9mm blade	1 set
71	Pliers combination 15cm	1set
72	Hand vice 3-7mm	1set
73	Screw driver (Electrician type)	1set
74	Soldering iron	1set
75	Spanner double ended set of 12 metric size 8 to 32mm.	1set
76	Spanner double offset double ended (set of 6) set of 7w/w from 3mm to 13.5mm.	1set
77	Double open ended ignition spanner of BAOXi to 8 x 9 set of 5	1set
78	Spanners, clybrun 15cm	1set
79	Spanners adjustable 20cm	1set
80	Spanner ring of set of 6.5 A.E	1 set
81	Spanner for sparking plug 14mm	1 set
82	Spanner socket set of 8 handled T-bar ratchet	1set
83	Spanner T-flex for screwing up and unscrewing inaccessible position .	1set
84	Gun, paraffin pressure	1set
85	Ring spanner set of 12 metric 8-32mm	1set
86	Injector cleaning kit (set of 12)	1set
87	Hydrometer (Consumable tool)	1set
88	Circlip plier	1set
89	Circlip plier	1set
90	Timing lighter	1set
91	Scraper bearing	1set
92	Fillet radius gauge	1 set
93	Cylinder gauge, bore dial gauge with accessories	1 set
94	Torque wrench (0 to 75 kg meter)	1 set
95	Chisel	1 set
96	Rope Ladder	1
97	Life saving appliances	1 set
98	Co <sub>2</sub> Fire extinguisher	1
99	Dry powder fire extinguisher	1