

Course Curricula for

**Short Term Courses based on Modular
Employable Skills (MES)**

In

MARINE ENGINEERING Sector

**DIRECTORATE GENERAL OF EMPLOYMENT & TRAINING
MINISTRY OF LABOUR AND EMPLOYMENT
GOVERNMENT OF INDIA**

Skill Development based on Modular Employable Skills (MES)

Background

The need for giving emphasis on the Skill Development, especially for the less educated, poor and out of school youth has been highlighted in various forums. The skill level and educational attainment of the work force determines the productivity, income levels as well as the adaptability of the working class in changing environment. Large percentage of population in India is living below poverty line. One of the important causes is lower percentage of skilled persons in the workforce

The skill development at present is taking place mostly in the informal way, i.e. persons acquire skill at the work-place when they help their parents, relatives and employers etc. Such persons do not have a formal certificate and thus earn lower wages and are exploited by employers. They have come through informal system due to socio-economic circumstances of the family and the compulsions of earning a livelihood rather than attending a formal course. While their productivity is low, their contribution to the national GDP cannot be ignored. If the country can create a system of certification which not only recognizes their skills but also provides education and training in a mode that suits their economic compulsions, it will not only benefit the workforce to earn a decent living but also contribute to the national economy by better productivity of this workforce.

Another related problem to be tackled is large number of students drop outs (About 63% of the school students drop out at different stages before reaching Class-X).

Frame work for Skill Development based on 'Modular Employable Skills (MES)'

Very few opportunities for skill development are available for the above referred groups (out of school youth & existing workers especially in the informal sector). Most of the existing Skill Development programmes are long term in nature. Poor and less educated persons can not afford long term training programmes due to higher entry qualifications, opportunity cost etc. Therefore, a new frame work for Skill Development for the Informal Sector has been evolved by the DGET to address to the above mentioned problems. The **key features of the new frame work for skill development** are:

- ◆ Demand driven Short term training courses based on modular employable skills decided in consultation with Industry
- ◆ Flexible delivery mechanism (part time, weekends, full time)
- ◆ Different levels of programmes (Foundation level as well as skill upgradation) to meet demands of various target groups
- ◆ Central Government will facilitate and promote training while Vocational Training (VT) Providers under the Govt. and Private Sector will provide training
- ◆ Optimum utilisation of existing infrastructure to make training cost effective.

- ◇ Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially.
- ◇ Testing & certification of prior learning (skills of persons acquired informally)

The Short Term courses would be based on 'Modular Employable Skills (MES)'.

The **concept for the MES** is :

- Identification of 'minimum skills set' which is sufficient to get an employment in the labour market.
- It allows skills upgradation, multiskilling, multi entry and exit, vertical mobility and life long learning opportunities in a flexible manner.
- It also allows recognition of prior learning (certification of skills acquired informally) effectively.
- The modules in a sector when grouped together could lead to a qualification equivalent to National Trade Certificate or higher.
- Courses could be available from level 1 to level 3 in different vocations depending upon the need of the employer organisations.
- MES would benefit different target groups like :
 - Workers seeking certification of their skills acquired informally
 - workers seeking skill upgradation
 - early school drop-outs and unemployed
 - previously child labour and their family

Age of participants

The minimum age limit for persons to take part in the scheme is 14 years but there is no upper age limit.

Curriculum Development Process

Following procedure is used for developing course curricula

- Identification of Employable Skills set in a sector based on division of work in the labour market.
- Development of training modules corresponding to skills set identified so as to provide training for specific & fit for purpose
- Organization of modules in to a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, pre requisites for higher level modules and how one can progress from one level to another.
- Development of detailed curriculum and vetting by a trade committee and by the NCVT

(Close involvement of Employers Organizations, State Governments, experts, vocational training providers and other stake holders is ensured at each stages).

Development of Core Competencies

Possession of proper attitudes is one of the most important attribute of a competent person. Without proper attitudes, the performance of a person gets adversely affected. Hence, systematic efforts will be made to develop attitudes during the training programme.

The trainees deal with men, materials and machines. They handle sophisticated tools and instruments. Positive attitudes have to be developed in the trainees by properly guiding them and setting up examples of good attitudes by demonstrated behaviors and by the environment provided during training.

Some important core competencies to be developed are:

1. Safety consciousness and safe working practices
2. Care of equipment and tools
3. Punctuality, discipline and honesty
4. Concern for quality
5. Respect for rules and regulations
6. Concern for health and hygiene
7. Cordial relationship and Cooperation with co-workers and team Work
8. Positive attitude and behavior
9. Responsibility and accountability
10. Learn continuously
11. Communication Skills
12. Concern for environment and waste disposal

Following competencies should also be developed during level-II and higher courses:

1. Ability for planning, organizing and coordinating
2. Creative thinking, problem solving and decision making
3. Leadership
4. Ability to bear stress
5. Negotiation

Duration of the Programmes

Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different backgrounds and experience. Duration has been prescribed in hours in the curriculum of individual module, which are based on the content and requirements of a MES Module. However, some persons may take more time than the prescribed time. They should be provided reasonable time to complete the course.

Pathways to acquire Qualification:

Access to the qualification could be through:

- An approved training programme; **Or**
- A combination of an approved training programme plus recognition of prior learning including credit transfer; **Or**
- The recognition of prior learning that provides evidence of the achievement of the competencies for the qualification.

Methodology

The training methods to be used should be appropriate to the development of competencies. The focus of the programme is on “performing” and not on “Knowing”. Lecturing will be restricted to the minimum necessary and emphasis to be given for ‘hands on training’.

The training methods will be individual centered to make each person a competent one. Opportunities for individual work will be provided. The learning process will be continuously monitored and feedback

will be provided on individual basis.

Demonstrations using different models, audio visual aids and equipment will be used intensively.

Instructional Media Packages

In order to maintain quality of training uniformly all over the country, instructional media packages (IMPs) will be developed by the National Instructional Media Institute (NIMI), Chennai.

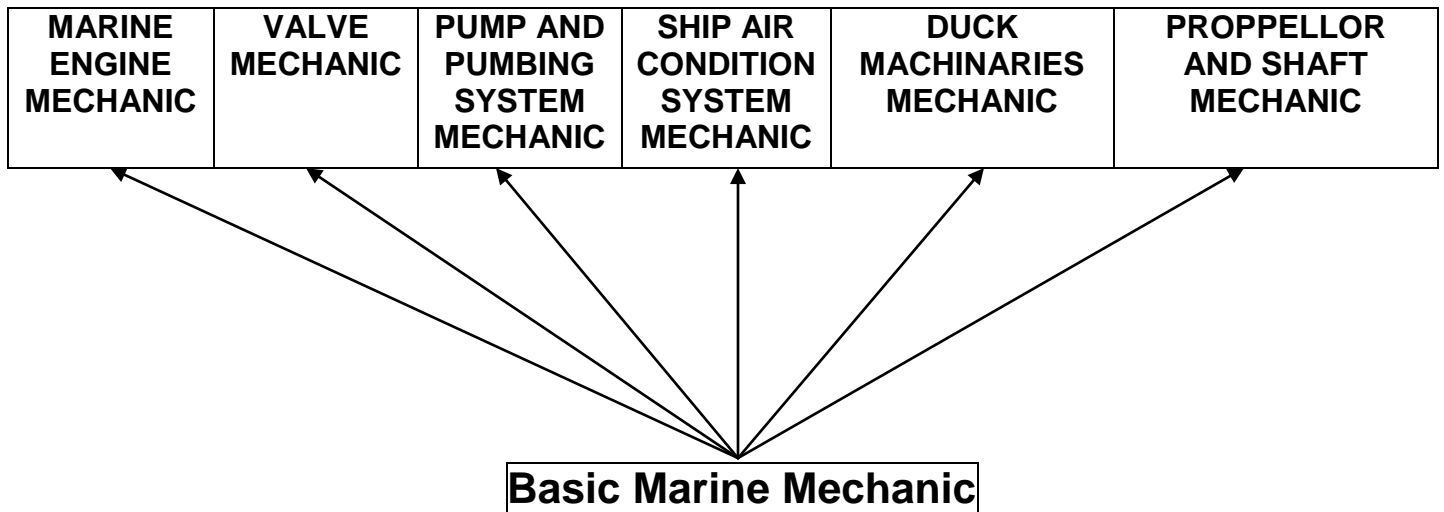
Assessment

DGE&T will appoint assessing bodies to assess the competencies of the trained persons. The assessing body will be an independent agency, which will not be involved in conducting the training programmes. This, in turn, will ensure quality of training and credibility of the scheme. Keeping in view the target of providing training/testing of one million persons through out the country and to avoid monopoly, more than one assessing bodies will be appointed for a sector or an area.

Certificate

Successful persons will be awarded certificates issued by National Council for Vocational Training (NCVT).

Course Matrix



Level-I

NAME OF MODULE : **BASIC MARINE MECHANIC**
SECTOR : **MARINE ENGINEERING**
CODE : **MRN 101**
ENTRY QUALIFICATION : **8TH STANDERD AND ABOVE 14 YEARS**
TERMINAL COMPENTENCY : **AFTER COMPLETION OF THIS COURSE THE PARTICIPENTS WOULD BE ABLE TO ASSIST,**
A) MARINE ENGINE MECHANIC
B) MARINE PUMP MECHANIC
C) MARINE AUXILIARIES MECHANIC
SUCH AS COMPRESSORS, PURIFIERS, CLARIFIRES, VALVES, REFRIGERATION EQUIPMENTS ETC ...

DURATION : **120 HOURS**

CONTENTS

UNDERPINNING KNOWLEDGE(THEORY)	PRACTICAL COMPENTENCIES
<u>SAFETY PRACTICE</u> <ul style="list-style-type: none"> Lifting and handling loads Heavy equipments. Use of fire extinguishers. Types of fire and extinguishers. 	<ul style="list-style-type: none"> Safety practice lifting and handling. Fire fighting fire extinguishing.
<ul style="list-style-type: none"> General safety of tools and equipments. 	<ul style="list-style-type: none"> Proper use of working tools and equipments.
<ul style="list-style-type: none"> Use and precautions taken while using measuring instruments. 	<ul style="list-style-type: none"> Measurements taken by micrometer, vernier calipers, dial gauges etc.
<ul style="list-style-type: none"> <u>SHIP THEORY(FAMILIARIZATION)</u> Technical information of ship like port, starboard, forward aft- double bottom tanks, load line etc. 	<ul style="list-style-type: none"> <u>STEERING GEAR & RUDDER</u> Mechanic steering gear, electro hydraulic steering gear & Its hydraulic system. Types of fully balanced, , pintle clearance, jumping clearance etc.
<ul style="list-style-type: none"> <u>TYPES OF SHIPS</u> Passenger, cargo, container, oil tanker, OBO (oil, bulk, ore) reefer cargo, car carrier etc. 	<ul style="list-style-type: none"> <u>LIFE SAVING APPLIANCES</u> Use of life jackets, life boats, signaling equipments etc.
<ul style="list-style-type: none"> <u>DUCK MACHINERIES</u> Familiarization of cranes, mooring winches, windlass etc. 	<ul style="list-style-type: none"> General information of removal and assembly of different types of propellers.
<ul style="list-style-type: none"> <u>PROPELLER SYSTEM</u> Types of propellers, bow thrusters, bulbous bow etc. 	
<ul style="list-style-type: none"> <u>DIESEL ENGINE</u> Fundamentals of I.C engines, its operation. Study of parts like piston, cy: head, valves, rocker arm, connecting rod, C/shaft, bearings, cam and cam shaft etc.. Necessity of lubrication, cooling, fuel system. Turbo charges, fuel pumps etc. 	<ul style="list-style-type: none"> Complete disassembly, assembly, importance of proper marking, cleaning of diesel engines and its auxiliaries. Study or repair of safety devices like C/case explosion door, relief valves indicator cocks. Air starting valves etc.
<ul style="list-style-type: none"> <u>PUMPS</u> 	<ul style="list-style-type: none"> Opening and repair of different pumps.

Different types of pumps and its use. Setting clearances, renewal of bearing, wear rings, gears, screws, valves etc.	Coolers condensers. Checking run out, renewal of bearings etc.
<ul style="list-style-type: none"> • <u>COMPRESSORS</u> Different types of compressors, its operation, necessity of inter cooling safety devices, like bursting discs, relief valves etc. 	<ul style="list-style-type: none"> • <u>OVERHAULING OF COMPRESSOR</u> Special care taken while setting suction, discharge valves, cy: heads. C/ case, inter coolers and after coolers etc.
<ul style="list-style-type: none"> • <u>AUXILIARIES</u> General study of purifiers, clarifiers, oil separators and refrigeration equipments etc. 	<ul style="list-style-type: none"> • Over hauling of purifier separator, refrigerator equipment etc.

Tools and Equipments

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1
10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set
14	Number punch	1set
15	Scriber	1
16	out side caliper	1
17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set
20	Rachet handle	1
21	Extesion bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extesion bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set

27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm2	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set
49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set
53	Vernier caliper12" .300mm	1
54	Steel rule 300mm	1
55	Screw pitch gauge British thred	1set
56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"-.025"	1set
59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1

66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver(assorted)	1set

Level II

Name of the Module	: MARINE ENGINE MECHANIC
Sector	: MARINE ENGINEERING
Code	: MRN202
Entry Qualification	: 8th Standard + MRN 101
Duration	: 240 Hours
Terminal Competency	: On completion of this course the participant would be able to repair Marine Engine.
Contents:-	

Underpinning Knowledge (Theory)	Practical Competencies
<p>Fundamentals of internal combustion engine, Terminology- classification of internal combustion engine. Working principle of four stroke and two stroke engine, cycle of operation, valve timing, diagram, scavenging, difference, between two stroke engine and four stroke engine. Components of marine diesel engine bed plated, crank journal, crank web, main bearing, connecting rod bearing, connecting rod bolt, and nut, crank case, timing gear, thrust bearing, cylinder block, cylinder liner, piston, piston ring, connecting rod, Gudgeon pin, can shaft, cylinder head, gasket bush-valve, valve seat, valve guide, valve spring, valve rotator, push rod, rocker arm, rocker arm cover, rocker arm adjusting bolt and nut, inlet manifold, exhaust manifold, air starting valve, turbo charger, rotor, fuel pump, and fuel injections.</p>	<ol style="list-style-type: none"> 1. Dismantle engine complete. 2. Clean and pressure test cylinder block and cylinder head. 3. Test cylinder block and head for warping. 4. Test cam follower bores. 5. Test and refit rocker arm shaft with new bushes. 6. Remove and refit valve seat inserts if necessary. 7. Remove and refit valve guides. 8. Cut/grind valve seats to correct angles. 9. Reface valves. 10. Lap valves on their seats. 11. Check crankshaft and camshaft bearings for wear. 12. Test connecting rod for twist and bend. 13. Check, clean and refit piston rings in the ring grooves. 14. Remove, clean, check and refit gudgeon pins and bushes. 15. Check big end bearings. 16. Check alignment of bearings. 17. Check oil passages in the crank shaft and engine block and clean. 18. Overhaul oil pump and oil filters. 19. Measure cylinder bores and chart the readings. 20. Measure crankshaft and Torque Main bearings with Torque wrench. 21. Measure crank pins and main journals. 22. Assemble piston and connecting rod assembly in cylinder block. 23. Assembly cylinder head and valve assembly. 24. Check and adjust valve timing. 25. Adjust valve Tapper clearance. 26. Replace timing cover oil seal and fit timing cover to block. 27. Assemble oil pump, oil filter and sump. 28. Fit Glow plugs. 29. Start Engine and adjust slow speeds.

Fuel Systems:

1. Clean and Test fuel tank for leaks.
2. Dismantle clean and refit primary fuel filters with Replacement elements.
3. Dismantle, clean, inspect, reassemble, and fit transfer pumps.
4. Overhaul injection pumps.
5. Phase and Calibrate F.I. Pump (Demonstration only).
6. Remove, clean, Replace filter element and fit filters.
7. Checking and correcting leaks in fuel pipe lines.
8. Check and fill up Lubrication oil in fuel injection pumps.
9. Bleed air from fuel supply system.

Lubrication System:

1. Drain Lubricating oil and replenishing the pumps.
2. Remove, clean oil filters. Replace filter elements and refit on engine.
3. Overhaul oil pumps.
4. Check and adjust the oil pressure relief valve.
5. Remove, clean and refit oil coolers.

Cooling System:

1. Reverse flush cooling system.
2. Remove, test and fit thermostats,
3. Remove, clean, test and refit Hose pipes.
4. Overhaul water pumps.
5. Hydraulic pressure testing of cylinder head, cylinder blocks and water and oil coolers.

Starting System:

1. Practice in use of Manufacture's hand books.
2. Testing and over hauling of air starting valve.
3. Maintenance of Air compressor.
4. Overhauling of Twin fuel system.
5. Overhauling of compressors.
6. Check up wear in hand starter equipment.
7. Remover Dismantle. Clean and reassemble and fit electric starter Motors.

Exhaust System:

1. Remove clean and refit Air filers.
2. Overhauling of air intake system.
3. Remove, clean and refit inlet and exhaust manifolds.
4. Remove, clean and refit exhaust pipes and silencer box.

Checking leaks in manifold joints and fitting new Gaskets

Tools and equipments:

- 1 File Flat / Round/ Half Round/ Triangular/Square
Smooth and Rough – Different size
- 2 Hacksaw frame
- 3 chisel
- 4 Ball peen hammer
- 5 Chipping hammer
- 6 Center punch
- 7 Letter punch
- 8 Number punch
- 9 Scriber
- 10 out side caliper
- 11 Inside caliper
- 12 Drill bit Different size
- 13 Ratchet box
- 14 Ratchet handle
- 15 Extension bar
- 16 Sliding 'T' bar
- 17 Universal joint
- 18 Ring spanner Different size
- 19 Flat spanner Different size
- 20 Screw spanner Different size
- 21 Puller
- 22 Cutting Wheel
- 23 Grinding Wheel
- 24 Pipe wrench Different size
- 25 Micro meter 0.25mm (0.01mm)
- 26 Vernier caliper 12" .300mm
- 27 Steel rule 300mm
- 28 Screw pitch gauge British thread
- 29 Screw pitch gauge metric thread
- 30 Feeler gauge
- 31 Measuring tape

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1

10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set
14	Number punch	1set
15	Scriber	1
16	out side caliper	1
17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set
20	Rachet handle	1
21	Extesion bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extesion bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set
27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm ²	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set

49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set
53	Vernier caliper12" .300mm	1
54	Steel rule 300mm	1
55	Screw pitch gauge British thred	1set
56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"-.025"	1set
59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1
66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver(assorted)	1set

Level II

Name of the Module	: VALVE MECHANIC
Sector	: MARINE ENGINEERING
Code	: MRN 203
Entry Qualification	: 8th Standard+ MRN 101
Duration	: 120 Hours
Terminal Competency	: On completion of this course the participant would be able to repair all types of valves.

Contents:-

Underpinning Knowledge (Theory)	Practical Competencies
Description functions, materials of different types of valves used on ships. Gate valve its construction and usage. Screw down valve, its construction and usage. Non-return valves, construction and usage. Butterfly valves, construction and usage. S.D.R valve construction and usage. 3 way and 2 way cocks usage and construction. Strong valves construction and operation.	Repairs of valves. Dismantling, overhauling and assembling of various types of valves. Inspection of dismantled items, calibration of valves, spindle etc. Determination of gland packing, lapping of valve and valve seat. Checking of valve seat, impression with valves. Hydraulic testing of assembled unit by using test pump.

Tools and Equipments

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1
10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set
14	Number punch	1set
15	Scriber	1
16	out side caliper	1

17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set
20	Rachet handle	1
21	Extension bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extension bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set
27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm2	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set
49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set
53	Vernier caliper12" .300mm	1
54	Steel rule 300mm	1
55	Screw pitch gauge British thred	1set

56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"-.025"	1set
59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1
66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver(assorted)	1set
76	Fabricated special tools for valve lapping.	
78	Packing removing tool.	
79	Gasket cutting tool kit.	
80	Hole punch set.	
81	Grinding paste, coarse, medium and fine.	

Level II

Name of the Module : PUMP & PUMPING SYSTEM MECHANIC

Sector : MARINE ENGINEERING

Code : MRN 204

Entry Qualification : 8th Standard+ MRN 101

Duration : 120 Hours

Terminal Competency : On completion of this course the participant would be able to repair pump and pumping system

Contents :-

Underpinning Knowledge (Theory)	Practical Competencies
Types of pumps- Reciprocating Centrifugal, axial, screw, sludge system, bilge, ballast piping arrangement. Brief description about cargo oil pumps and stripper, its functions.	Repair of pumps and compressors. Dismantling, overhauling, and assembling of various pumps. Fresh water pump, sea water, lub bowl pump and cargo oil pump, stripper pump, Bilge and ballast pump. Checking of various clearness of impeller with caring inspection of wear ring, fabrication of new wear ring. Matching of impeller for trueness, inspection of impeller shaft, dimensional check up of pump shaft by using precision of instruments. Function of mechanical seal. Usage of gland packing on pumps and determination of its size. Checking of free rotation after assembling. Ball or roller bearing removal and refitting methods by using special tools

Tools and equipments:

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1
10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set

14	Number punch	1set
15	Scriber	1
16	out side caliper	1
17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set
20	Rachet handle	1
21	Extesion bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extesion bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set
27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm2	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set
49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set

53	Vernier caliper 12" .300mm	1
54	Steel rule 300mm	1
55	Screw pitch gauge British thred	1set
56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"-.025"	1set
59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1
66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver (assorted)	1set
74	Bearing puller.	
75	Hydraulic press for bearing installation.	
76	Impeller balancing machine.	

Level II

Name of the Module	: SHIP AIRCONDITION SYSTEM MECHANIC
Sector	: MARINE ENGINEERING
Code	: MRN 205
Entry Qualification	: 8th Standard+ MRN101
Duration	: 120 Hours
Terminal Competency	: On completion of this course the participant would be able to repair ship Cooling system.

Contents:-

Underpinning Knowledge (Theory)	Practical Competencies
Familiarization of AC System on board vessel HVAC, Different types of Compressor, Condenser, Evaporators, Expansion V/Vs, Blowers, Ducts and Air Filters. Study of Line diagram of Ac System.	Familiarization of AC System on board vessel. HVAC, Different types of Compressor, Condenser, Evaporators, Expansion V/Vs Blowers, Ducts and Air Filters. Study of Line diagram of Ac System

Tools

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1
10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set
14	Number punch	1set
15	Scriber	1
16	out side caliper	1
17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set

20	Rachet handle	1
21	Extesion bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extesion bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set
27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm2	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set
49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set
53	Vernier caliper12" .300mm	1
54	Steel rule 300mm	1
55	Screw pitch gauge British thred	1set
56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"- .025"	1set

59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1
66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver(assorted)	1set
74	Vaccum pump	
75	Gas leak testing ket	
76	Differential pressure gauge for gas charging	

Level II

Name of the Module	: DECK MACHINARIES MECHANIC
Sector	: MARINE ENGINEERING
Code	: MME 206
Entry Qualification	: 8th Standard+ MRN101
Duration	: 120 Hours
Terminal Competency	: On completion of this course the participant would be able to repair ship cooling system.

Contents :-

Underpinning Knowledge (Theory)	Practical Competencies
<ul style="list-style-type: none">• Windlass, construction and working principle.• Hydraulic crane, derrick, mooring winches and its maintenance.• Butter writhing machine (cargo, oil washing machine) its operation and maintenance.• Insert gas system: operation, gas generating system.• Maintenance of insert gas blowers and its auxiliaries.	<ul style="list-style-type: none">• Dismantling, checking of hydraulic motors, and winches, over hauling of butter writhing and insert gas system.

Tools and equipments:

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1
10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set

14	Number punch	1set
15	Scriber	1
16	out side caliper	1
17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set
20	Rachet handle	1
21	Extension bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extension bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set
27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm2	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set
49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set

53	Vernier caliper 12" .300mm	1
54	Steel rule 300mm	1
55	Screw pitch gauge British thred	1set
56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"-.025"	1set
59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1
66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver (assorted)	1set

Level II

Name of the Module	: PROPELLOR & SHAFT MECHANIC
Sector	: MARINE ENGINEERING
Code	: MRN 207
Entry Qualification	: 8th Standard+ MRN 101
Duration	: 120 Hours
Terminal Competency	: On completion of this course the participant would be able to repair ship propeller and shaft
Contents :-	

Underpinning Knowledge (Theory)	Practical Competencies
<ul style="list-style-type: none">• Types Of propellers, and Rudders and Bow Thrusters. Definition of Bulbous Bow, Winches Different types of Cranes • Procedure of removal and refitting of propeller and simplex seal. Removal of coupling bolt and Plummer block. Inspection of stern tube bearing.	<ul style="list-style-type: none">• Alignment of shaft: Carrying out alignment with various machineries. Checking of shaft alignment by using dial gauge, straight edge try square and feeler gauge • Rigging and removal of cone propeller nut rope guard and propeller. • Removal of simplex seal and inspection and calibration of stern tube bearing.

Tools and equipments:

1	Flat file smooth - 300mm	1
2	Flat file rough - 300mm	1
3	Half round smooth-300mm	1
4	Half round rough-300mm	1
5	Triangular rough - 300mm	1
6	Round file rough - 300mm	1
7	Try square -300mm	1
8	Ball peen hammer	2
9	Chipping hammer	1
10	Center punch	1
11	Screw spanner 12 inch	1
12	Screw spanner 8 inch	1
13	Letter punch	1set
14	Number punch	1set
15	Scriber	1

16	out side caliper	1
17	inside caliper	1
18	Drill bit box 6mm- 12mm	1 set
19	Ratchet box full set in 9mm- 32mm	1set
20	Rachet handle	1
21	Extesion bar 10"	1
22	Sliding 'T' bar 12"	1
23	Universal joint 1	1
24	Extesion bar 5"	1
25	Ring spanner 10mm- 32mm	1set
26	spanner 10mm- 32mm	1 set
27	Brass drifts(assorted)	3
28	cir clip plier(inside)	2
29	cir clip plier(outside)	2
30	piston ring extractor	1
31	Torque spanner 1- 50 kg/cm2	1
32	Rubber mallet	2
33	screw spanner 6"	1
34	Pullar 10"& 8"	1each
35	Cutting wheel	As per required (12)
36	Grinding wheel	As per required (12)
37	Pipe wrench12"	1
38	Pipe wrench 8"	1
41	Tap set 30mm	1set
42	Eye bolts 5mm- 20mm(assorted)	10 nos
43	Sludge hammer 2lbs	2 nos
44	Prussion blue	1 tube
45	Hand grinder	1 nos
46	Buffing disc	2 nos
47	Power handle 3/4" drive	1
48	Gold smith files(needle file)	1set
49	Split pins (assorted)	1box
50	Heavy duty socket 17mm- 36mm	1set
51	Inside Micro meter 0.25mm (0.01mm)	1set
52	Out side Micro meter 0.25mm (0.01mm)	1set
53	Vernier caliper12" .300mm	1
54	Steel rule 300mm	1

55	Screw pitch gauge British thred	1set
56	Screw pinch gauge metric thred	1set
57	Feeler gauge 0.05- 1.00mm	1set
58	Feeler gauge .001"-.025"	1set
59	Small scale 15mm	2
60	Measuring tape 5m	2
61	Measuring tape 3m	1
62	Cutting wheel	1
63	Oxygen hose	25m
64	Acetylene hose	25m
65	Acetylene cylinder	1
66	Oxygen cylinder	1
67	Oil can 400mm	1
68	Spark lighter	1
69	Regulator oxygen	1
70	Regulation acetylene	1
71	Open end spanner double (10mm-32mm)	1set
72	Chisel flat 12"	1
73	Flat screw driver(assorted)	1set
74	Chain block of required capacity	
75	Wire slings, nylon belt, D.schakle, hydraulic jacks of required capacity.	
76	Special tool for holding propeller nut.	

List of Expert/Trade Committee Members
CURRICULUM DEVELOPMENT FOR SHORT TERM COURSES BASED ON
MODULAR EMPLOYABLE SKILLS
SECTOR/AREA: **Marine Engineering (MRN)**

1. **A.M Abdulla** Bsc Engineering Retd. Merchant Navy – Chairman
2. **M.K Sreenivasan** DME Retd. Engineer from Cochin Shipyard - Member
3. **T.A Ajeesh** B.tech in Marine Engineering – Member
4. **Anil Chacko** B.tech in Marine Engineering – Member