1. Course Title: Pre-Sea Rating Training (Electrical)

2. Scope With reference to convention Imo Model Course: This course is intended for fresh trainees who have not previously served on board a ship to prepare them for working as engine ratings. This training, together with the Basic Safety Training (STCW Code A-VI/1.2) and company arranged Training will cover the mandatory minimum training requirement prescribed in Regulation VI/1 and III/4-2.2.2 of International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW), (as amended) Code.

Main content of the course covers orientation and familiarization of ship in general and machinery space and machinery, equipment & plants therein in particular. This includes training on duties, functions, responsibilities and watch keeping in addition to Emergency, Safety and Survival.

3. Objective:

1. This Course will provide sufficient knowledge for a person intending to go to sea as an Engine Rating to operate and work on

the shipboard machinery and systems typical of either motor or steam ship in a safe and efficient manner.

2. On successful completion of this Course, the participant should be able to:
    a. Describe the basic layout of a typical engine room and its piping systems with the essential components, their functions, interconnections and safety and pollution hazards.
    b. Identify the common types of fuels, lubricants, solvents etc used on board, stating their purpose and safety hazards.
    c. Identify the individual components, which make up the items of shipboard machinery used in the engine room and elsewhere.
    d. Understand the requirements and procedures for watch keeping in the machinery space as an engine rating.

4. Course Outline Shore base & On board Training:

PROFESSIONAL TRAINING (189 hours):

Subject Area		Hours	
1. Ship and Shipping Familiarization		Lectures	Practical
1.1	Introduction	0.75	
1.2	Ship, shipboard organization, structure and process	1.50	
1.3	Department of Shipping, Government of Bangladesh	1.50	
1.4	Seafarer and ship-owner organizations	0.75	
1.5	Seafarer and the Law	1.50	
		6.00	

2. Electrical Systems			
2.1	DC Machines	4.50	
2.2	AC Machines	7.50	5.00
2.3	Transformer	4.00	4.00
2.4	Switch board	2.00	2.00
2.5	Distribution	1.50	1.50
2.6	Control gears	1.50	1.50
2.7	Elementary Instrumentation	1.50	
2.8	Basic Control Concepts	1.50	
		24.00	**14.00**

3. Deck Machinery			
3.1	Winches and windlass	3.00	
3.2	Lifting gears	2.00	2.00
3.3	Hydraulics	2.50	2.50
		7.50	**4.50**

4. General Electrical Knowledge			
4.1	Lighting system	2.00	2.00
4.2	Batteries	2.00	2.00
4.3	Electrical Safety	2.00	
4.5	Fault finding	2.00	
		8.00	**4.00**

5. Machinery Operation			
5.1	Pumps	4.50	
5.2	Air Compressors	2.00	
5.3	Purifiers	2.00	
5.4	Diesel Engines	2.50	2.50
5.5	Air conditioning and Refrigeration plant	4.50	4.50
5.6	Boiler	2.50	
5.7	Pollution prevention and control equipment	1.50	1.50
5.8	Safe working practice in machinery space	1.50	1.50
		21.00	**10**

6. Workshop Practice			
6.1	Personal, general and machine safety		1.50
6.2	File and filing		3.00
6.3	Drilling machines and drills		4.50
6.4	Measuring, testing and gauging tools		3.00
6.5	Electrical Fitting		7.50
6.6	Hand tools		7.50
6.7	Welding, brazing and soldering		15.00
			42.00

8. English			**34.5**

7. Visits			
7.1	Ship		4.50
7.2	Dry-dock		4.50
7.3	Marine Workshop		4.50
			13.5
	Total:	**101.00**	**88.00**

Total Course Hours: **189**

5. Competence Standard/Course Syllabus Checked with up-to-date STCW/IMO Model Course:

Learning Objectives

		Hours
1	**Ship and Shipping Familiarization**	**6.0**
1.1	**Introduction** .1 Understands the outline of Bangladesh Merchant Services .2 Lists cargoes and trade3 patterns	0.75
1.2	**ship, shipboard organization, structure and process** .1 Describes shipboard organizational set up .2 Understands rules that governs ships administration .3 Knows duties and responsibility of different ranks	1.5
1.3	**Department of Shipping, Government of Bangladesh** .1 Understands the importance of Mercantile Marine Office .2 Knows the significance of Ship's Article .3 States procedure for joining and leaving ship	1.5
1.4	**Seafarer and Ship-owner organizations** *Understands the relevance of* .1 Ship-owners .2 Unions .3 Crewing agents	0.75
1.5	**Seafarer and the Law** *Has the basic concept of* .1 IMO and ILO Conventions .2 Bangladesh Merchant Shipping Recruitment, Training and Certification Rules .3 Bangladesh rules relating to safety of seafarers	1.5
2	**Electrical Systems**	38
2.1	**DC Machines** .1 Introduction .2 Introducing DC Machine .3 Kinds of DC Machine .4 DC Generators .5 General principle .6 Simple loop Generator .7 Types of DC Generator .8 Parallel operation of DC Generator .9 DC Motors .10 Principle of DC Motor .11 Type of DC Motors .12 Characteristics of DC motor .13 Voltage equation and significance of back EMF .14 DC motor controlling system and starters	4.5

Learning Objectives

		Hours
2.2	**AC Machines** .1 Introduction .2 Kinds of AC machine	**7.5**

	.3 AC Generators operation .4 Generator excitation method .5 Automatic voltage regulation .6 Generator in parallel operation .7 Emergency Generators .8 Generator protection .9 Generator maintenance .10 AC motor construction .11 Enclosures & ratings .12 Control equipments .13 Reduced voltage starting .14 Motor protection .15 Motor maintenance	
2.3	**Transformer** .1 Working principle of transformer .2 Types of transformer .3 Elementary theory of an ideal transformer .4 EMF equation of a transformer .5 Voltage transformation ratio .6 Transformer oil tests .7 Regulation of a transformer .8 Efficiency of transformer .9 Auto transformer .10 Three-phase transformer .11 Three-phase transformer connection a) star-star, b) delta-delta, c) star-delta, d) delta-star	4.0
2.4	**Switch Board** .1 Main switch board (MSB) a) 440V supply switch board b) 110V supply switch board .2 Emergency switch board (ESB) a) 440V supply emergency switch board b) 110V supply emergency switch board	2.0
2.5	**Distribution** .1 Power distribution system .2 Insulated & earthed neutral system .3 Significance of earth faults .4 Distribution circuit breakers .5 Shores supply connection	1.5
2.6	**Control gears** .1 Switch gear .2 Necessity of switch gear .3 Air circuit breaker .4 Busber .5 Feeder	1.5
2.7	**Elementary Instrumentation** .1 AVO meter .2 Watt meter .3 Energy meter .4 Clamp meter	2.0

	.5 Mugger .6 Frequency meter .7 Volt meter .8 Ampere meter .9 Test lump	
2.8	**Basic Control Concepts** .1 MCB .2 MCCB .3 Type of MCB .4 Fuse .5 Relay .6 Types of relay	2.0
3	**Deck machinery**	12.0
3.1	**Winces and Windless**	3.0
3.2	**Lifting gears** .1 Lists all the lifting equipment and there accessories used on board ships .2 Describes the safe use of lifting equipment .3 understands the code of hand signals for use with lifting appliances	2.0
3.3	**Hydraulics** .1 Lists the hydraulics power system available onboard ships .2 Understands the principles of fluid power .3 Describes the care maintenance and safety associated with hydraulic system	2.5
4	**General Electrical Knowledge**	12.0
4.1	**Lighting system** .1 Ship's lighting .2 Many types of lights .3 Discharge lamps .4 Voltage effects on lighting .5 Navigation and signal lights .6 Emergency lighting .7 Maintenance of lighting	2.0
4.2	**Batteries** .1 Explains the use and applications of batteries onboard ships .2 Describes basic construction of shipboard batteries .3 Understand the importance's and procedure of battery maintenance	2.0
4.3	**Electrical safety** .1 Lists the electrical safety device and protections e.g. earthling, fuses, circuit breakers, trips etc. .2 States correct use and application of different types of meters e.g. multimeter, megger instrument, tong tester etc .3 Identifies the hazards of eclectic shock .4 States how to avoid electric shock and immediate actions to be taken incase of electrocution .5 Describes proper procedure for electrical isolation of components and systems	2.0
4.4	**Fault finding** .1 Insulation resistance .2 circuit testing	2.0

	.3 insulation and continuity testing .4 Multi meters .5 Diode tests .6 Current clamp meters .7 Live line tests .8 Line to line faults & line to earth faults	
5	**Machinery Operation**	38.0
5.1	**Pumps** .1 States the function of pumps .2 List the names of different types of pumps and their applications onboard .3 Understands that a centrifugal pump needs priming .4 States that a positive displacement pump may be rotary or reciprocating .5 Explains why a positive displacement pump must have pressure relief arrangement .6 Describes the procedures for starting and stopping a centrifugal pump and a positive displacement pump.	4.5
5.2	**Air compressors** .1 States the functions and duties of air compressors and compressed air on board the ships .2 Lists the names of different types of marine air compressors .3 Identifies the major components of multistage reciprocating air compressor .4 Sates the purpose and location of the following fittings and safety devices of an air compressor intake air filter, pressure gauges, relief valves, drains, bursting discs, high temperature alarm & shut down, low lube oil pressure/level alarm & shut down .5 Describes the procedures for starting and stopping an air compressor manually .6 States the functions of an air receiver .7 Names the mountings fitted to an air receiver .8 Explains the importance of regular draining of an air receiver .9 Understands the different pressures are maintained in the compressed air system	2.0
5.3	**Purifiers** .1 Lube oil purifier .2 Heavy oil	2.0
5.4	**Diesel Engines** .1 Classification characteristics .2 Construction and components .3 Starting and reversing .4 Supercharging .5 Cooling, lubricating and fuel systems .6 Engine safely and interlocks	2.50
5.5	**Air conditioning and Refrigeration plant** .1 Describes the applications of refrigeration and air	4.50

	conditioning systems onboard ships .2 Understands the lay out and basic working principle of a vapor compression refrigeration system as found onboard ships .3 Identifies the four major components i.e. compressor, condenser, TX-valve and evaporator and describes their functions .4 Lists the names and knows the functions of common fittings and safety devices as fitted to a shipboard vapor compression system .5 States the precautions necessary when handling refrigerants and working on refrigeration systems .6 Aware of the environmental hazards associated with CFCs	
5.6	**Boilers** .1 States the function and duties of a boiler .2 Understands the basic constructions of a fire tube and a water tube boiler .3 States the difference between oil fired, exhaust and composite boilers .4 Defines low pressure, high pressure and dual pressure boilers	2.5
5.7	**Pollution control equipment, systems and procedure** .1 Lists the names of pollution control equipment normally found onboard ships .2 Understands the basic working principles of an oily water separator .3 Describes the starting and stopping procedures of an oily water separator .4 States that some ships may have a stop tank to collect bilge .5 Explains the actions to be taken to minimize the effects in case of an oil pollution from the ship .6 Aware of the Shipboard Oil Pollution Emergency Plan	4.5
5.8	**Safe Working Practice in machinery space** .1 Introduction .2 Personal safety gears .3 Lifting equipment .4 Isolation of systems	1.5
6	**Workshop Practice**	42.0
6.1	**Personal , general and machine safety** .1 Knows the use of items in the Workshop .2 Identifies the hazards associated with Workshop Practice .3 Describes the safe work practice in the Workshop	1.5
6.2	**File and filling** .1 Recognizes different types of files .2 Detects different grades and cut of teeth .3 Performs filling of a surface and tests for fairness	3.0
6.3	**Drilling machines and drills** .1 Identifies different types of drilling machines and drills .2 Performs countersigning, counter boring and spot facing operations .3 Calculates correct drilling speeds and identifies causes of drill failure .4 Performs setting up holding work	4.5

	.5 Sharpens the drill correctly	
6.4	**Measuring, testing and gauging tools** .1 Recognizes different measuring, testing and gauging tools .2 Uses protractors, straight-edge, combination set .3 Works with different types of gauges and calipers	3.0
6.5	**Electrical fitting** Navigation lights, riding light on stem, exhaust pipe, vent, life ring, chain plate, trawl winch, propeller, propeller shaft & prop, port light, bar fitting, side light boards, rigging screw, copper wire, searchlight on stand, life ring, cowl vent, rubbing strake, stanchion 3-ball, navigation light boards, flagstaff, single bollard, anchor-plastic, flag staff, fairlead, davit, capstan wheel on stand, rubbing strake, steam siren, capstan W/hand spokes, ships wheel, belaying pin, side light, ships bell, stock anchor-plastic, binnacle on stand, vent-plastic, slewing crane, block, single-plastic, mushroom vent, rigging thread, light, direction finding frame, cannon barrel, funnel, stern light, manual anchor winch, electric winch, lifebelt, warping end winch reel, horn-bugle, prop shaft bracket, stanchion 3-ball, electric anchor winch, radar receiver, direction finding frame trawl winch	7.5
6.6	**Hand tools** .1 Identifies different types of tester, family set (screwdriver), Screw driver (flat), screw driver (star), multi meter, clip-on meter, adjustable whence, tie cutter, hammer, combination pliers, cutting piers, torch light, cable cutter, round cutter, drill machine, blower, hydraulic puncher, hand puncher, megger, tools bag/box, lock, spammer set , Ring set, wreset set, T-10 set, electric tape, mercer pen, marking paper, L-N- key set, hydro meter, soldering iron, Lid, test lamp, nose aiers	7.5
6.7	**Welding, brazing and soldering** .1 Identifies welding and gas cutting equipment and their components .2 Welding .3 brazing .4 soldering	15
7	**English**	34.5
7.1	**Spoken English** .1 Knows how to greet, show etiquette, order, request, question and use verbs .2 Uses pronouns, prepositions, correlatives, active and passive voices, temporal, emphasis, countable nouns and idiomatic sentences correctly .3 Makes sentences of invitation, meeting, parting, gratitude, congratulations, good wishes, refusal, relating to meals, permission, encouragement, consolation, affection, negation, consent, apologies and annoyance .4 Understands the common terms regarding health, doctors, hospitals, animals, games, post office, restaurants, shopping, transport, law, drugs and contraband items, police, immigration and all day to day affairs .5 Knows correct spelling, pronunciation, abbreviations and phrases .6 Understands common words and terms used onboard by multinational crew	27.0

7.2	**Marine & Electrical Related Vocabulary** .1 Understands words and expressions relating to shipboard procedures, responses, urgent messages, position, courses, bearings, distances, speed, numbers, geographical names and time .2 Knows the terms associated with dangers to Navigation, warnings and assistance .3 Discusses events relating to anchoring, arrival, berthing, departure,, maneuvering, pilot age, fairway navigation, canal and lock operations and routing. .4 Knows common shipping terminology associated with course, radar, tide, storms, ports, weather, fishing, helicopters, ice-breakers etc. .5 Knows how to communicate between ship-to-ship, ship-to-shore and witching sip by wireless or VHF sets .6 Electrical Related Vocabulary	
8	**Visits**	13.5
8.1	**Ship** .1 Guided tour of ships available in Chittagong port	4.5
8.2	**Dry-dock** .1 Supervised visit to the Chittagong Dry-dock	4.5
8.3	**Marine workshop** .1 Guided tour of BSC Marine Workshop of other suitable marine workshops	4.5

6. Entry Standard, Selection Criteria of Students:
Passed Secondary school Certificate
Age limits: 16-20 years.

7. Intake limitation, with specific mention Instructor-student ratio:
For practical exercises student/teacher ratio should not exceed 10:1

8. Qualification and experience of instructors:
Minimum qualification of any instructor must be Class 4 Marine Engineer officer certificate of competency or equivalent with relevant sea experience.

9. Qualification and experience of assessors: The practical exercises must be conducted and achievement of competency must be assessed under the supervision of a retained or serving fire fighter (or a person with equivalent qualifications and experience). The person conducting the practical training must be in possession of a recognized First Aid qualification. The ratio of staff to students for the practical exercises involving live fires or the use of breathing apparatus should not exceed 1:8.

10. Details Facilities & Equipment, materials and resources available for the training; Visual aids lecture Notes, Library facilities, Rental documents, Workshops Training Equipment: Navigational, Engineering, Communication, Seamanship etc:
To be in corporate.

11. Conduct of Training with number of classroom lectures, practical work use of simulator, video etc:

Day / Period	1st Period 0900-0930	2nd Period 0945-1030	3rd Period 1030-1115	TEA BREAK 1115-1145	5th Period 1145-1230	6th Period 1230-1315	7th Period 1315-1400
Sunday	Dry- Dock Visit			TEA BREAK	Dry- Dock Visit		
Monday	ENG	ENG	MO		MO	WS	WS
Tuesday	ENG	ENG	MO		MO	WS	WS
Wednesday	ENG	ENG	MO		MO	WS	WS
Thursday	ENG	ENG	MO		MO	WS	WS

12. Total duration of Training; Duration of Practical's:
Theory- 101.0 hrs.
Practical- 88.0 hrs.
Assessment- 13.5 hrs.

13. Assessment procedure, whether independent of instruction or continuous performance evaluation:
Short answer, multiple choice, fill in the blanks, hot spot, true/false and sketch labeling type questions in a written test are used for assessment, Practical assessment includes direct observation of ability under realistic situation.

14. Formats of certificate to be issued with correct reference to STCW and reference to approval and authorization by the Department of Shipping and contact point of the issuing institution for verifying authenticity:

Cert No : 2017.02.000147.R

DoS No :2017.02.000147.R

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

ন্যাশনাল মেরিটাইম ইন্সটিটিউট

NATIONAL MARITIME INSTITUTE

South Halishahar, P.O. Bandar, Chittagong-4100, Bangladesh.
Phone : +88-031-740569, Fax : +88-031-800620, E-mail : info@nmi.gov.bd

PRE-SEA (ELECTRICIAN) RATING TRAINING CERTIFICATE

This is to certify that,

Mr. **MD. OSMAN GONI** Son of Mr. **MD. ABDUL KADER** Date & Place of Birth **01-Jan-1995 & NOAKHALI** has successfully completed a course on PRE-SEA (ELECTRICIAN) RATING TRAINING CERTIFICATE conducted at the National Maritime Institute, Chittagong, Bangladesh.

from **01-Feb-2017** to **24-Aug-2017**

The course has the approval of the Department of Shipping, Government of the People's Republic of Bangladesh.

Date of Issue : **29-Sep-2017**

CERTIFIED TRAINING INSTITUTE

Signature of the Holder

Principal

to verify this certificate visit- **www.nmi.gov.bd**

15. Maintenance of records in Data-base for facilitation of checking including assessments:
NMI will maintain a data-base of all the students who have completed the course. The following records for each individual will be kept so as to ensure that the certificate is issued to a candidate who has met the requirements as laid down by the governing authority regarding issuance of a certificate on Bridge Resource Management.

- Application form
- Assessment papers after completion of course
- Attendance Sheet
- Attested Xerox copy of the issued certificates & licenses
- A registered data-base in hard copy and soft form

16. Internal Quality Standard System if any. Students Impressions, past results:
The institute maintains quality standard system ISO 9001:2008, Certified by DNV GL

17. Course notice served, course conducted as per course notice, progression report served:
Will be complied as per DOS Instruction.

18. Attendance of Students and Instructors:
Students and Instructor attendance sheet attached.

Annex- 03

NATIONAL MARITIME INSTITUTE

TRAINING RECORD

Instructor:

Venue:

Subject:

Brief description on training material:

Attendance:

Name & rank	Sign	Name & rank	Sign	Name & rank	Sign

Signature
Management Representative

Signature
Principal