ON BOARD TRAINING RECORD BOOK

FOR CANDIDATES FOR CERTIFICATION AS

ELECTRO-TECHNICAL OFFICER

AS REQUIRED BY THE STCW CONVENTION 1978,AS AMENDED 2010

DEPARTMENT OF SHIPPING
GOVERNMENTS OF THE PEOPLE'S
REPUBLIC OF BANGLADESH

Introduction

On board training of the future Electro-Technical Officers should be done according to the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 2010 (STCW 1978/10).

This On Board Training Record Book (TRB) includes sea training tasks for Electro-Technical Cadets.

During this training electrical cadet gains professional skills and experience necessary in the work as a Electro-Technical Officer. On board training skills gained according to the programme included in the TRB fulfil the minimum requirements for certification as an Electro-Technical Officer.
During sea training the cadet learns to combine theoretical knowledge from Maritime University/Training Centre and practice. It allows the future Electro-Technical Officer to learn the job on modern and automated seagoing ships.

Sea training properly integrated with theoretical education is necessary for an officer of a contemporary ship. Practical training should be completed under supervision of the chief engineer and Designated Shipboard Training Officer (DSTO) and other designated officers. Properly filled TRB is evidence that the electrical cadet has achieved professional skills and experience required in the standards of competence according to the Code A of Convention STCW 1978/10 (Section A-III/6). That is why the TRB should be precisely filled up.

After completion of shipboard training, TRB is checked and accepted by the Training Record book issuing authority / Examination Commission.

Guidance for completing Training Record Book

1. During the seagoing service, the Electro-Technical Cadet is under supervision of chief engineer and is obliged to follow a planned training system which is included in the On Board Training Record Book and to fulfil ship's regulations and work directions.

2. The Electro-Technical Cadet receives his On Board Training Record Book in return for a receipt, in the University/Training Centre which is responsible for his education. Each Book has its own number given and registered by university/training centre.

3. The Electrical Cadet is personally responsible for completion of the On Board Training Record Book during his whole sea service on different ships.

4. Immediately after joining each ship, the Electro-Technical Cadet should:

    - start with shipboard and safety familiarization tasks,
    - record the particulars of the ship.

5. Next, during on-board service, the cadet should complete the tasks listed in the On Board Training Record Book and obtain signatures of Designated Shipboard Training Officer and other authorized officers.

6. DSTO and other authorized officers are designated by chief engineer from on board officers.

7. It may be not possible for the cadet to complete some tasks listed in the On Board Training Record Book due to the type of joined ship. In this case, appropriate information should be written at the task which was not completed.

8. It is not necessary to complete all tasks on one ship. It can be done on subsequent ships.

9. Electro-Technical Cadet should complete the tasks in such a manner, that the DSTO is absolutely sure of satisfactory performance of trainee's competence.

10. In some cases Electro-Technical Cadet can be obliged to fulfil the tasks more than once. The decision to repeat the task depends on the DSTO.

11. When the Electro-Technical Cadet completes the task, it is understood that he is considered competent in this task. The DSTO or other authorized officers confirm it with their signature in the appropriate space of a given task.

12. The On Board Training Record Book should be submitted to the:

    - Chief engineer after joining the ship and before leaving the ship,
    - Chief engineer and DSTO at the end of each month and on each their request, during service on board.

13. Training Record book issuing authority shall inspect the On Board Training Record Book to ensure that the candidate for certification as Electro-Technical Officer is considered competent.

14. Training Record book issuing authority can extend requirements included in the On Board Training Record Book (e.g. reports, descriptions).

ASSIGNMENTS

Assignment no	Page no	Ship ref. no	Date	Certification		Remark
				Supervising Engineer	Chief engineer	
01. Describe Main Engine Slow down, Shut down and mechanism.						
02. Draw main engine interlock circuit.						
03. Draw main engine Jacket water auto Temperature controller Diagram.						
04. Draw Typical Ship's electrical power distribution single line diagram.						
05. Emergency Power distribution Diagram.						
06. Shore Supply Diagram.						
07. Brushless alternator working principle and diagram.						
08. Working principle of AVR with diagram.						
09. Synchroscope construction, working principle and diagram.						
10. Working principle of ACB, VCB & SF6 circuit breaker.						
11. Reverse power relay working principle and diagram.						
12. Describe safeties and trips of MSBD.						
13. Working principle and diagram of a) Ammeter b) Voltmeter c) Wattmeter d) Frequency meter e) Power factor meter f) Phase sequence indicator. g) Earth fault indicator						
14. **Diagram of Following Starter with control circuit :** • DOL • STAR DELTA • AUTO TRANSFORMER • SOFT STARTER & • VFD						

ASSIGNMENTS

15. Engine room Over head crane diagram.						
16. Typical Diagram of Air conditioning and Refrigeration system.						
17. Describe boiler Starting & Stopping Sequence						
18.Draw Auto combustion control diagram of boiler						
19.Describe boiler safeties & Draw boiler starting interlock circuit.						
20. MGPS working principle and diagram.						
21. ICCP working principle and diagram.						
22. Describe Fire alarm system.						
23. Battery charger diagram.						
24. Diagram of Steering gear system.						
25. Block diagram of auto pilot system.						
26.Navigational light circuit diagram						
27. Function of the following bridge equipment : • AIS • GPS • ECO SOUNDER • ECDIS • SPEED LOG • ANEMOMETER • RADAR • MAGNETIC COMPASS • GYRO SYSTEM • LRIT • VDR • NAVTEX • SAT-C • ALDIS LAMP						

Personal History

Photo

Fill Name

Permanent Address

Date of Birth

Seaman's Registration Number

Training College

Shipping Companies

Undertaking training and their address

Government

Administration

Department issuing the Training and Assessment Record book

Date of issue

ENGINEER OFFICER IN CHARGE OF A WATCH: _____

SHIP DATA

SHIP REFERENCE NUMBER _____

SHIP NAME MV _____ CALL SIGN _____

Port of registry	_____
Gross registered tons	_____
Net registered tons	_____
Deadweight	_____
Load displacement	_____
Cargo	_____
Length Overall (m)	_____
Beam (m)	_____
Summer Draft loaded (m)	_____
Service speed (knots)	_____
Shaft power (kw)	_____
Propellers	_____
Service r.p.m.	_____
Bunker capacity	_____
Daily fuel consumption	_____
Fuel type and viscosity	_____

Emergency gear	No.	Capacity
Lifeboats		
Rafts		
Fire-fighting pumps		

SHIP SERVICE RECORD

SHIP REF. NO	NAME OF SHIP/PORT OF REGISTRY	SERVICE PERIOD				SIGNATURE OF Chief Engineer
		Dates		Service		
		Joining	Leaving	m	d	

SUPERVISING ENGINEER REVIEW OF TRAINING PROGRESS

Ship	Comments	Name of Shipboard Training Officer	Initials	Date

CHIEF ENGINEER'S INSPECTION OF RECORD BOOK

Ship	Comments	Name of Chief Engineer	Chief Engineer's Initials	Date	Ship's Official Stamp

COMPANY TRAINING OFFICER'S INSPECTION OF RECORD BOOK

Company Name	Comments	Name of Company Training Officer	Initials	Date

SAFETY FAMILIARIZATION*

Ship Ref. No.						
Task/Duty	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date
Be able to: Communicate with other persons on board on elementary safe matters						
Understand safety information symbols, sign and alarm signals						
Know what to do if: A person falls overboard Fire or smoke is detected The fire or abandon ship alarm is sounded						
Be able to: Identify muster and embarkation stations and emergency escape routes						
Locate and don life jackets						
Raise the alarm and have a basic knowledge of the use of portable fire extinguishers						
Take immediate action upon encountering an accident or other medical emergency before seeking further medical assistance on board						
Close and open the fire, weather tight and watertight doors fitted in the particular ship, other than those for hull openings.						

* Use different sheet for each ship.

SAFETY FAMILIARIZATION*

Ship Ref. No.						
Task/Duty	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date
Watch keeping procedures and arrangements: Visit engine room and other work areas						
Get acquainted with main and auxiliary engine equipment and displays						
Activate, under supervision, equipment to be used in routine duties						
Safety and emergency procedures: Read and demonstrate an understanding of your company's Fire and Safety regulations						
Demonstrate recognition of the alarm Signals for: FIRE EMERGENCY ABANDON SHIP						
Locate medical and first aid equipment						
Locate fire-fighting equipment: alarm activating points, alarm bells, extinguishers, hydrants, fire axes and hoses						
Locate : Rocket line throwing apparatus						
Distress rockets, flares and other pyrotechnics						
Breathing apparatus and fire-fighting's outfits, etc.						
Locate and explain how to operate emergency deck stop mechanism for main engines, including other emergency stop valves.						

- Use different sheet for each ship.

SHIPBOARD FAMILIARIZATION*

Ship Ref. No.						
Task/Duty	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date	Officer's Initials/Date
Safety and emergency procedures (continued): Locate CO_2 or halon bottle room, and control valves for smothering apparatus in pump rooms, cargo tanks and holds						
Locate and explain the operation of the emergency pump						
Environmental protection: Get acquainted with: the procedure for handling garbage, rubbish and other wastes						
the use of garbage compactor or other equipment as appropriate						

Insert Boat and Fire Muster Stations and other details in the appropriate space, ask the Shipboard Training Officer to sign in the space Provided

Ship's Name						
Boat Muster Station						
Fire Muster Station						
Shipboard Training Officer						
Shipboard Training Officer						
Date						

III – PROPULSION PLANT

a-1 Technical details – diesel propulsion plant

Main engine

- make, type and building year
- principal dimensions : cylinder bore
  piston stroke
- ratio crank length/connecting rod length
- construction
- output
- number of cylinders
- reversible or non-reversible
- 2 or 4-stroke process
- scavenging system
- supercharging system
- trunk piston or crosshead construction
- direct or indirect injection
- number of inlet and outlet valves
- highest and lowest number of revolutions
- kind of fuel
- compression pressure
- maximum combustion pressure
- lube oil pressure behind last bearing
- specific fuel consumption
- method of starting

Coupling/reduction gearing

- make, type and building year of coupling or reduction gearing
- type of coupling (plate/hydraulic,reversible,etc.)
- type of reduction gearing
- reduction rate
- type of too thing
- operation of coupling

Remarks :	Reviewed by Supervising Engineer .... (Initials) (Date)

III – PROPULSION PLANT

a-1 Technical details – diesel propulsion plant

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Remarks :	Reviewed by Supervising Engineer .... (Initials) (Date)

a-2 Technical details – steam propulsion plant

Main turbine
- manufacture, type year built
- type of turbine, drive system
- type and number of stages HP turbine
- type and number of stages LP turbine
- number of RPM (HP and LP)
- power out put
- inlet steam pressure
- inlet steam temperature
- extractions steam pressure
- reheat steam pressure and temperature
- exhaust steam pressure
- exhaust steam temperature
- type of governer and trip mechanisms

Reduction gear assembly
- manufacture, type, year built
- reduction ratio
- type of teeth
- name each type of gear of assembly

Main boiler
- manufacture, type, year built
- steam generating capacity
- steam pressure/ temperature
- combustion control system/burner management system
- feed water control system
- superheat steam temperature control
- type of desuperheater
- type of economizer/air heater
- soot blower arrangement
- safety value arrangement
- list of boiler mounting and internals
- fuel system (number of pumps and heaters)
- air register
- fuel atomizer system

Remarks :	Reviewed by Supervising Engineer .... (Initials) (Date)

III – PROPULSION PLANT (cont'd)

a-3 Technical details – steam propulsion plant

Thrust block
- type
- separate or built-in

Shafting
- components
- maximum revolution/minute
- type of stern tube and gland
- type and number of bearings

Propeller
- make type
- fixed/controllable pitch/contra rotation
- number of blades
- right/left handed
- pitch

Thrusters (Bow and/or Stern)
- number
- location
- make type, year of construction
- type of drive
- maximum electrical power consumption
- maximum output power
- steering gear
- manufacture, type, year built
- pump, ram arrangements
- follow up arrangements
- emergency arrangements
-

Remarks :	Reviewed by Supervising Engineer .... (Initials) (Date)

III – PROPULSION PLANT

b-1 Technical details – steam propulsion plant

Describe, based on a short outline of the main engine and associated auxiliary systems, as an operational entity, the possibility for control from control room and bridge console.

Also mention possible emergency devices and their control.

Describe the actions to be taken to maintain the main engine in good operational condition.

Please include:

- the cylinder pressures
- power output
- exhaust gas temperatures of each cylinder as well as temperatures before and after supercharger exhaust and air cooler temperatures and pressure.
- cooling and lubricating system details
- type of fuel injection
- fuel temperature and viscosity

Number of pages of assignment: .....

Reviewed by Supervising Engineer

....
(Initials) (Date)

III – PROPULSION PLANT

b-2 Assignment steam plant

Describe, based on a short outline, the main engine and water cycle associated auxiliary system found on board your vessel as an operational entity for the possibility of control from a control room and bridge console.

Also include emergency devices and their control.

Describe the actions to be taken to maintain the main boiler and turbine in good operational condition.

Please include operating parameters for:

- condensate system (i.e. condenser, pump, heater)
- air ejector/pump
- feedwater system (i.e. deaerator, feed pump)
- combustion air heaters
- main and auxiliary piping system
- combustion control system
- fuel oil system
- lube oil system
- sea water cooling system
- evaporator/condenser system

Number of pages of assignment : .....

Reviewed by Supervising Engineer

....
(Initials) (Date)

IV – AUXILIARY SYSTEMS

a. Technical details

A Prime movers of generators

Diesel engine
- number on board
- manufacture, type and building year
- power output
- number of revolutions
- two or four-stroke process
- type of scavenging and turbo charging
- type of fuel
- engine starting equipment
- maximum combustion pressure
- specific fuel consumption
- governer and trip details

Turbine
- manufacture, type and building year
- type, of turbine(s)
- number of stages
- reduction gear
- number of revolutions
- power output
- live steam pressure
- quality of steam
- exhaust steam pressure
- governer and trip details

Emergency diesel generator
- manufacture, type and building year
- two or four-stroke process
- power output
- way of starting
- number of revolutions
- governer details

Continuation technical details

B Fuel system	
Fuel transfer pumps	- number on board - type - capacity
Fuels	- available types
Tanks - capacity settling tank(s) - capacity day tank(s) - capacity sludge tank(s)	- capacity fuel storage tank(s)
Fuel cleaning system - number of purifiers - type of purifiers - capacity of purifiers - number of clarifiers - type of clarifiers - capacity of clarifiers	- make and year of manufacture
Fuel heater	- type
Viscosity controller	- type
Fuel blending system - capacity	- type
C Lubricating oil system	
Main lub-oil pumps	- number on board - type - capacity
Lub oil purifiers	- number on board - type

Continuation technical details

D Fresh-water system

Fresh-water evaporator
- number on board
- type
- capacity
- heating medium

E Refrigerating plant for cargo and refrigerated spaces

Cargo

Refrigerated holds - number on board
- volume of each hold
- working principle

Compressors - number on board
- working principle
- make, type and year of construction
- power consumption
- refrigerant (primary and/or secondary)
- cooling agent
- capacity control

Provisions

Chill book - number on board
- working principle
- temperature
- way of eooling

Freeze box - number on board
- working principle
- temperature

Continuation technical details

Compressors	- number on board - working principal - manufacturer, type and year of construction - power consumption - refrigerant (primary and/or secondary) - cooling agent - cooling capacity

F Starting, control and general air system

Starting air compressors - number on board
- working principal
- manufacturer, type and year of construction
- capacity
- working pressure
- stage cooling temperatures

General air compressors - number on board
- working principal
- manufacturer, type and year of construction
- capacity
- working pressure

Control air compressors - number on board
- working principal
- manufacturer, type and year of construction
- capacity
- working pressure
- type of cooling

Associated air system equipment - filters
- dryers
- reducers
- gauging
- pressure vessels
- relieving devices
- starting air valves
- starting air motor

G Auxiliary boilers

Oil-fired steam boilers And system	- number on board - working principle - manufacturer, type and year of construction - working pressure - safety devices, alarms and controls - capacity - burner management - combustion control

Oil-fired thermal Oil heater

- number on board
- working principal
- manufacturer, year of construction
- type
- working pressure
- capacity
- control system

Exhaust gas steam boilers

- number on board
- working principal
- manufacturer, type and year of construction
- working pressure
- capacity
- control system

Exhaust gas thermal Oil heater

- number on board
- working principal
- manufacturer
- manufacturer, year of construction
- capacity
- control system

Hydraulic system

- pump
- pipe and hoses
- filters
- strainers
- high pressure vessels
- reducers
- valves
- relieving devices
- control system

cooling water system

- fresh water cooling system
- sea water cooling system

Remarks:	Review by supervising engineer ..... (Initials) (Date)

b. **Assignment**

Almost all ships are equipped with a heat generating plant. This plant

1. an oil-fired steam boiler
2. an oil-fired thermal oil heater
3. an exhaust gas boiler combined with the boiler sub 1
4. an exhaust gas boiler combined with the boiler sub 2
5. an exhaust gas heater combined with heater sub 2

The steam as produced by a plant sub 1 or 2 may- except for heating purpose- may also be used for driving pumps and generators.

Give a description based on a diagram of the design. Operation and control of plants mentioned above sub 1 through 5. The following items should be dealt with:

a) the circuit of the generated steam or heated oil

b) preparation to be made before the plant is put into operation. For the plants sub 3 and 4 the right order to be kept: first the oil- fired boiler, next the exhaust gas boiler

c) putting it into operation and the required checks during firing-up for both oil-fired and exhaust gas boilers

d) checks and boiler control during operation

e) automatic control for starting up and shutting down the exhaust gas boiler and oil-fired boiler

f) safely-devices of the plant; mandatory safety requirements

g) starting up, running and shutting down an existing turbo-generator

h) the testing and treatment of boiler and feed water

i) the specific cheeks and safety measures in case of thermal oil being used

j) condensate system

k) evaporation system

Review by supervising engineer

V – ELECTRICAL PLANT

a Technical details – Main, Auxiliary, Emergency, Distribution Panels, Switch Gear

Generators

- number on board
- manufacturer and year of construction
- voltage
- frequency
- apparent power
- power and service factor
- method of cooling generator

Shaft generators

- number on board
- manufacturer, year of construction
- voltage
- frequency
- apparent power
- power and service factor
- method of drive
- maximum and minimum permissible revolutions of the driving engine
- method of frequency and voltage control

Emergency generator

- ..... on board
- manufacturer, type, year of construction
- apparent power
- power and service factor
- method of drive

Continuation technical details

Converters and rectifiers

- number on board
- working principle
- incoming and outgoing voltage
- incoming and outgoing current
- consumed and produced power

Transformers

- number on board
- working principle
- purpose
- primary and secondary voltage and current
- apparent power

Battery sets

- number on board
- working principle (primary and secondary)
- voltage
- maintenance procedures
- ventilation requirements
- battery charger

Remarks:	Review by supervising persons .... (Initials) (Date)

CHAPTER VIII – ELECTRICAL INSTRALLATION

The assignment for this subject is to be carried out in a very detailed manner. Knowledge is basically obtained from instruction manuals. However, the necessary skills often remain underdeveloped. It is desirable that the ship's management is able to find opportunities to involve trainees as much as possible, in solving problems in this field.

b Assignment

The electrical supply to the main switch board is accomplished by generators. The ship's supply is distributed from the main switch board.

1. Describe, on the basis of a diagram, how two generators are switched on to the ship's mains. Indicate how these generators work in parallel mode.
2. In case where the ship is equipped with a shaft generator, the parallel operation of the shaft generator And a diesel generator is to be described.

Indicate in both cases how the generators are protected and how load-sharing is accomplished. Some safety Devices have a time-delay. Mention these and explain why a time-delay is needed. How are these safety devices tasted?

In case two generators are running in parallel and the total load is higher than the maximum permissible load of one generator, then indicate in what a total power supply shutdown is prevented, if one of the generators shuts down due to a prime mover failure. In case of a main generator failure the electrical supply is partly taken over by the emergency generator or a battery set via the emergency switchboard. Describe:

a how the emergency generator is started: and,

b how the battery set is switched on.

Which machinery and devices are required to be connected to both the main and the emergency switchboard and why? Indicate how the emergency generator is prevented from overloading due to too much equipment being connected to the emergency switchboard . Which safety devices are fitted at the emergency switchboard and why?

Is there a switch connection between the emergency and main switchboard

Describe how the electrical supply is started up again after (whether or not factitious) a power failure has occurred.

Number of pages of assignment:	Review by supervising engineers .... (Initials) (Date)

VI – CARGO HANDLING AND STOWAGE

a Technical details

Cargo pumps (where appropriate)

- number on board
- manufacturer, year of construction
- working principle
- capacity
- maximum working pressure
- method of drive
- method and location of control and monitors

Ballast pumps

- number on board
- manufacturer, year of construction
- working principle
- capacity
- maximum working pressure
- method of drive
- method and location of control and monitors

Stripping pumps

- number on board
- manufacturer, year of construction
- working principle
- capacity
- maximum working pressure
- method of drive
- method and location of control and monitors

Insert gas plant

- working principle
- capacity
- method and location of control and monitors

Tank wash installation

- working principle
- capacity
- cleaning solvent

Remarks:	Review by supervising engineer .... (Initials) (Date)

VI – CARGO HANDLING AND STOWAGE

b Assignment

Make a report about cargo handling and stowage, concerning a part of the voyage in which there is a port of loading, a section of the voyage and a port of unloading. In the report the following subjects should be dealt with:

- information-exchange between shore and ship concerning the cargo, such as booking, shore preparation, stevedoring, special requirements
- preparing the ship for cargo carriage
- considerations leading to the chosen way of stowage, taking into account stability, trim, the occurrence of longitudinal stresses and potential for damage control
- loading the ship or part of it together with its interesting aspects; the stowage plan and possible annexes, including stability and trim calculations
- the use of cargo handling equipment
- the care of the cargo during the voyage
- making preparation for the actual unloading of the cargo
- measures to be taken in connection with safety of crew, cargo and environment
- possible financial and legal aspects such as ship's involvement in settlement of claims, notice of readiness, time sheet.

Number of pages of assignment	Review by supervising engineer .... (Initials) (Date)

VII – AUTOMATION TECHNOLOGY

a Technical details

General

Answering the following question depends a great deal on how the machinery inside and outside the engine room is automated: centralized by means of none or more computers, or decentralized with separate controllers, or a combination of both.

For all the parameters to be controlled which are listed separately below, the following characteristics should be mentioned (the entire control system need not be described):

General
- whether it concerns a control, adjustment or alarm system
- its location and from where it is operated
- how is the measured signal fed to the computer

Centrally controlled
- whether it concerns a control, adjustment or alarm system
- its location and from where it is operated
- how is the measured signal fed to the computer

Decentrally controlled
- make and type of measuring transducer or sensor
- make and type of controller used
- make and type of correcting unit (e.g. control valves)
- make and type of positioners
- medium used for transmitting the measuring and control signals

Centralized automation

- make and type of computer(s)
- part of the system controlled by the computer
- size and division of computer memory
- way of input and output of signals (D/A and D/A conversion)
- possibility for emergency operation
- emergency voltage control

Controlled parameters

Number of revolutions

- main engine(s)
- auxiliary engine
- auxiliary turbine
- bow/stern thruster

Continuation technical details

Angels

- automatic pilot
- heel/automatic trim system
- heel/stabilizers

Temperatures

- cylinder cooling-water/hot cooling-water circuit
- piston cooling-water/ cooling oil
- lubricating oil
- secondary cooling-water circuit
- seawater circulating system
- incinerator
- cargo refrigerating plant
- provisions refrigerating plant
- air treatment system
- oil-fired thermal oil boiler
- exhaust gas thermal oil boiler

Pressures

- starting air
- control air
- general air
- whistle air
- lub oil main engine
- control oil main engine
- lub oil pressure auxiliary engines
- hydraulic oil for hull gates and valves
- steering engine oil
- oil-fired boiler
- exhaust gas boiler

Continuation technical details

Physical properties

- viscosity of fuel main engine
- quality of condensate
- oxygen content in inert spaces
- tank atmosphere
- exhaust gases of oil-fired boiler

Levels

- bilge water
- ballast tanks
- fuel tanks
- boiler water
- lub oil main engine
- steering engine oil

Remote control

- hatches
- side parts
- fuel tank valves
- watertight doors
- rudder

VII – AUTOMATION TECHNOLOGY

a Assignment

Choose and describe a separate control loop (somewhere) on board of the ship, like viscosity control, automatic pilot, a self-tension winch, a temperature, speed or pressure control, Such as:

- watertight sliding doors
- bow ports, side doors
- self-tension winches
- thrusters, cranes
- steering gear

Explain the operation of the equipment used.

To be expended

Seen by supervisor

....
(Initials) (Date)

Number of pages of assignment

VIII – SAFETY AND ENVIRONMENTAL PROTECTION, INSPECTION, MAINTENANCE AND REPAIRS

A Technical details

A Fire extinguishing system	
Fire pumps	- number on board - working principle - method of drive - capacity - pressure - location on board - operating positions
Emergency fire pump	- working principle - capacity - method of drive - location on board - operating positions
Fixed fire-fighting installation(s)	- working principle - protected space(s) - operating positions
Sprinkler installation	- working principle - protected space(s)
Fire detection system	- working principle - protected space(s)
Hydrants	- number on board
International shore connection	- number on board - location
Control systems	- location (s)

Continuation technical details

B Bilge pumping arrangement

Bilge ejector	- number on board - location - capacity
Bilge pumps	- number on board - location - working principle - capacity - operating positions

C Life saving equipment

Lifeboats	- number on board - working principle
Inflatable rafts	- number on board - manufacturer - number of persons
Rescue boats	- working principle - number of persons
Launching appliances	- number on board - working principle
Lifebuoys	- number on board - working principle
Lifejackets	- number on board - working principle - location
Immersion suits	- number on board - working principle

Continuation technical details

D Environmental protection	
Sewage treatment plant	- working principal - capacity
Bilge water treatment	- working principal - capacity - system of control - number of ppm of the effluent
Incinerator plant	- working principal - capacity - substances to be burnt - required fuel - maximum working temperature
Ballast water monitor	- working principle - system of control

Remarks:	Review by supervising engineer .... (Initials) (Date)

VIII – SAFETY AND ENVIRONMENTAL PROTECTION,
INSPECTION, MAINTENANCE AND REPAIRS

b Assignment

Repairs and maintenance tasks have to be carried out in consultation with the supervisor, When the trainee takes part in repair or maintenance work, then the report should contain the following points for emphasis:

1 reason for the repairs or the maintenance work

2 preparatory work

3 actual work, disassembly, etc.

4 condition of the opened device/machinery

5 measurements to be carried out and the results thereof

6 assembly of the component or the entire device/machinery

7 making it operational again and testing it

8 final conclusion about the possible cause and consequences; the question of who is guilty to be left out of consideration

9 possible theoretical considerations as a basis for the findings

The extent of the repair and maintenance tasks should (preferably) be such that the above-mentioned points can be included in the report, as far as possible accompanied by repair sketches and drawings used.

Number of pages of assignment :	Review by supervising engineer .... (Initials) (Date)

Function (1): Electrical, electronic and control engineering at the operational level

Competency (1): Monitor the operation of electrical, electronic and control system

(Basic understanding of the operation of mechanical engineering systems:Prime movers, including main propulsion plant)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Participate in maneuvering the main engine from the engine control room position, including starting, stopping and reversing.	Understanding and explanation is satisfactory.							
02	Demonstrate knowledge of the main engine fuel oil supply system.	Understanding and explanation is satisfactory.							
03	Demonstrate knowledge of the main engine lubricating oil system.	Understanding and explanation is satisfactory.							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (1): Monitor the operation of electrical, electronic and control system

(Basic understanding of the operation of mechanical engineering systems:Prime movers, including main propulsion plant)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
04	Demonstrate knowledge of the main engine jacket water cooling system	Understanding and explanation is satisfactory.							
05	Demonstrate knowledge of the main engine starting airsystem	Understanding and explanation is satisfactory.							
06	Demonstrate an understanding of operation principles and adjustment parameters of speed governor	Understanding and explanation is satisfactory.							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (1): Monitor the operation of electrical, electronic and control system

(Engine-room auxiliary machinery)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
07	Demonstrate knowledge of Auxiliary Engine control systems, alarms and trips	Understanding and explanation is satisfactory.							
08	Demonstrate knowledge of the Auxiliary Boiler operation principles	Understanding and explanation is satisfactory.							
09	Demonstrate knowledge of the procedures for preparation and starting of Auxiliary Boiler	Understanding and explanation is satisfactory.							
10	Demonstrate knowledge of the procedures for routine checking of burner	Understanding and explanation is satisfactory.							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (1): Monitor the operation of electrical, electronic and control system

(Engine-room auxiliary machinery)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
11	Demonstrate knowledge of procedures for the preparation and starting of air compressors.	Understanding and explanation is satisfactory							
12	Demonstrate knowledge of the use and operating principlesof centrifugal type pumps.	Understanding and explanation is satisfactory							
13	Demonstrate knowledge of procedures for routine operation and cleaning of fuel oil, diesel oil and lube oil separators.	Understanding and explanation is satisfactory							
14	Demonstrate knowledge of the operation and checking of the fresh water generator.	Understanding and explanation is satisfactory							

Function(1): Electrical, electronic and control engineering at the operational level

Competency(1): Monitor the operation of electrical, electronic and control system

(Engine-room auxiliary machinery)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
15	Demonstrate knowledge of construction of refrigeration andair-conditioning machinery and their operation.	Understanding and explanation is satisfactory							
16	Demonstrate knowledge of procedures for the preparation,starting and stopping of provision refrigeration plant.	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency(1): Monitor the operation of electrical, electronic and control system

(Steering systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
17	Demonstrate knowledge of procedures for the preparation,start and pre-sailing test of steering gear.	Understanding and explanation is satisfactory							
18	Demonstrate knowledge of procedures for the routine checks of steering gear during a sea passage.	Understanding and explanation is satisfactory							
19	Demonstrate knowledge of emergency steering gear system and its operation as well as the procedure for the changeover of steering gear operation to an emergency mode.	Understanding and explanation is satisfactory							

Function(1): Electrical, electronic and control engineering at the operational level

Competency(1): Monitor the operation of electrical, electronic and control system

(Cargo handling systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
20	Demonstrate knowledge of the operating principles and starting / stopping procedure for electric motor driven cargo pump.	Understanding and explanation is satisfactory							
21	Demonstrate knowledge of the operating principles and starting / stopping procedure for steam turbine cargo pump.	Understanding and explanation is satisfactory							
22	Demonstrate knowledge of the operating procedures and preparation of IGS for operation.	Understanding and explanation is satisfactory							
23	Demonstrate knowledge of the procedures for operation and checking of cargo/ ballast/ fuel oil handling valves remote system.	Understanding and explanation is satisfactory							

Function(1): Electrical, electronic and control engineering at the operational level

Competency(1): Monitor the operation of electrical, electronic and control system

(Cargo handling systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
24	Demonstrate knowledge of the operating principles and starting / stopping procedure for electric deck cranes.	Understanding and explanation is satisfactory							
25	Demonstrate knowledge of the operating principles and starting / stopping procedure for hydraulic deck cranes.	Understanding and explanation is satisfactory							
26	Demonstrate knowledge of the operating principles and operating procedures of hatch covers.	Understanding and explanation is satisfactory							
27	Demonstrate knowledge of the operating principle and starting / stopping procedure for provision cranes.	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (1): Monitor the operation of electrical, electronic and control system

(Deck machinery)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
28	Demonstrate knowledge of the operating principles and starting / stopping procedure for electric mooring winches, windlasses and capstans.	Understanding and explanation is satisfactory							
29	Demonstrate knowledge of the operating principles and starting / stopping procedure for hydraulic mooring winches, windlasses and capstans.	Understanding and explanation is satisfactory							
30	Demonstrate knowledge of the operating principles for lifeboats and gangway winches.	Understanding and explanation is satisfactory							
31	Demonstrate knowledge of the operating principles and starting / stopping procedure for hatch cover winches.	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (1): Monitor the operation of electrical, electronic and control system

(Hotel systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
32	Demonstrate knowledge of the construction and operating principles of galley equipment	Understanding and explanation is satisfactory							
33	Demonstrate knowledge of the construction and operating principles of laundry and hotel services	Understanding and explanation is satisfactory							
34	Demonstrate knowledge of the construction and operating principles of personal lifts	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (2): Monitor the operation of automatic control systems ofpropulsion and auxiliary machinery

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate knowledge of operations necessary to prepareand start the main engine.	Understanding and explanation is satisfactory							
02	Demonstrate knowledge of operations necessary to shutdown and prepare main engine to the harbor condition.	Understanding and explanation is satisfactory							
03	Demonstrate knowledge of the procedure for change over the main engine control from ECR to emergency maneuvering position.	Understanding and explanation is satisfactory							
04	Demonstrate an understanding of procedure for controlling the main engine from the emergency maneuvering position, including start, stop, reverse or CPP or reverse clutch operation.	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (2): Monitor the operation of automatic control systems ofpropulsion and auxiliary machinery

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
05	Demonstrate knowledge of the procedures for the preparation and starting of Auxiliary Engines.	Understanding and explanation is satisfactory							
06	Demonstrate knowledge of the procedures for preparationand starting of Auxiliary Boiler.	Understanding and explanation is satisfactory							
07	Demonstrate knowledge of procedures for the preparationand starting of air compressors.	Understanding and explanation is satisfactory							
08	Demonstrate knowledge of procedures for the preparation,starting and operation of air compressors.	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (2): Monitor the operation of automatic control systems ofpropulsion and auxiliary machinery

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
09	Demonstrate knowledge of procedures for the preparation,starting and stopping of provision refrigeration plant.	Understanding and explanation is satisfactory							
10	Demonstrate knowledge of procedures for the preparation, starting and stopping of air conditioning system for summer and winter conditions.	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (3): Operate generators and distribution systems

(Coupling, load sharing and changing over generators
Coupling and breaking connection between switchboards and distribution panels)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an understanding of the requirements to prepare and run a diesel or steam generator.	Understanding , explanation and operation is satisfactory							
02	Demonstrate an ability to take control, parallel the incoming machine with running machinery, transfer load and shut down outgoing machinery.	Understanding , explanation and operation is satisfactory							
03	Demonstrate an understanding of the electrical generation and distribution system on board, including system configuration where appropriate.	Understanding , explanation and operation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (3): Operate generators and distribution systems

(Coupling, load sharing and changing over generators
Coupling and breaking connection between switchboards and distribution panels)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
04	Demonstrate knowledge of construction and operation of the main and emergency switch boards.	Understanding , explanation and operation is satisfactory							
05	In relation to the vessel's main switchboard demonstrate an understanding of the application of: a) Voltmeter b) Ammeter c) Wattmeter d) Synchroscope e) Power factor meter f) Earthing / Low insulation indicating meter.	Understanding , explanation and operation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (3): Operate generators and distribution systems

(Coupling, load sharing and changing over generators
Coupling and breaking connection between switchboards and distribution panels)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
06	Demonstrate an understanding of the operation and purposeof the following trips and safety features in relation to a main switchboard circuit breaker: 1. Overload relay 2. Reverse power trip 3. Low frequency trip 4. Preferential trip 5. Under voltage relay Explain how they are tested	Understanding , explanation, testing and operation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency(3): Operate generators and distribution systems

(Coupling, load sharing and changing over generators
Coupling and breaking connection between switchboards and distribution panels)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
07	Demonstrate an understanding of the procedure required on board following a total electrical power failure								
08	Demonstrate an understanding of the procedure to be followed after main electrical system failure								

Function (1): Electrical, electronic and control engineering at the operational level

Competency (4): Operate and maintain power systems in excess of 1,000Volts

Safe operation and maintenance of high voltage systems, including knowledge of the special technical type of high voltage systems and the danger resulting from operational voltage of morethan 1,000 Volts –WHERE FITTED !!!

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an understanding of the use and operation ofthe following HV equipment: a) Switchboards b) Transformers c) Protection Relays d) Tripping and auxiliary supplies e) Earthing Lockout Systems and Key Safes	Understanding , explanation and operation is satisfactory							
02	Demonstrate an understanding of the purpose of thefollowing: a) Appreciation of fault levels, b) Marine application of electrical protection	Understanding and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (4): Operate and maintain power systems in excess of 1,000Volts

Safe operation and maintenance of high voltage systems, including knowledge of the special technical type of high voltage systems and the danger resulting from operational voltage of more than 1,000 Volts –WHERE FITTED !!!

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
03	Demonstrate an understanding of the role and purpose of the following protective systems: a) Discrimination b) Protective devices c) Feeder protection d) Transformer protection e) Motor protection f) Generator protection Bus-bar zone protection	Understanding , and explanation is satisfactory							
04	Understand the procedures for recording HV activities before, during, and on completion of the planned maintenance or inspection work	Understanding , and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (4): Operate and maintain power systems in excess of 1,000Volts

(Electrical propulsion of the ships, electrical motors and control systems – WHERE FITTED!!!)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
05	Demonstrate an ability to operate the following electricalpropulsions systems: a)Main propulsion motor b)Bow/stern thrusters unit c)Other large variable speed drives	Understanding , explanation and operation is satisfactory							
06	Understand the procedures for: Maneuvering the propulsion units from ECR; including stopping, starting following Bridge commands	Understanding , explanation and operation is satisfactory							
07	Demonstrate an ability to carry out routine testing of propulsion systems (such as prior to sailing), unit alarms and trips.	Understanding , explanation and operation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (4): Operate and maintain power systems in excess of 1,000Volts

(Electrical propulsion of the ships, electrical motors and control systems – WHERE FITTED!!!)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
08	Demonstrate an ability to make adjustments to propulsion motor operational parameters (e.g. max power) and generator supply system priority.	Understanding , explanation and operation is satisfactory							
09	Describe the following systems: a)HV distribution system for propulsion systems b)LV distribution system for propulsion systems c)Propulsion motor cooling systems.	Understanding and explanation is satisfactory							
10	Demonstrate an understanding of the procedure to be followed after main electrical system failure (black-out).	Understanding , and explanation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (5): Operate computers and computer networks on ships

(Main features of data processing, construction and use of computer networks on ships bridge-based, engine-room-based and commercial computer use)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an understanding of the process to re-install software on a stand-alone or networked pc	Understanding , explanation and operation is satisfactory							
02	Demonstrate an ability to replace and reconfigure a pcconnected to an internal network.	Understanding , explanation and operation is satisfactory							
03	Demonstrate an ability to back-up data from a pc storage device e.g. hard drive or similar	Understanding , explanation and operation is satisfactory							
04	Demonstrate an ability to isolate and reset/restart one internal communication system and computer network system on board	Understanding , explanation and operation is satisfactory							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (6): Use English in written and oral form

(Adequate knowledge of the English language to enable the officer to use engineering publicationsand to perform the officer's duties)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an ability to communicate in English languagewith ship officers and the other crew members.	Communication is satisfactory							
02	Demonstrate an ability to use and understand engineering publications in English language.	Reading skill is satisfactory							
03	Demonstrate an ability to prepare in English language several documents, i.e. reports of the works carried out, materials and spare parts orders, shipyard planned maintenance list.	Writing skill is satisfactory.							

Function (1): Electrical, electronic and control engineering at the operational level

Competency (7): Use internal communication systems

(Operation of all internal communication systems on board)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an ability to operate the internal telephone system (PABX)	Understanding , and operation is satisfactory							
02	Demonstrate an ability to operate emergency telephonesystem (sound powered)	Understanding , explanation and operation is satisfactory							
03	Demonstrate an ability to operate portable VHF equipment	Understanding , explanation and operation is satisfactory							
04	Demonstrate an ability to operate public address system	Understanding , explanation and operation is satisfactory							

Function (2): Maintenance and repair at the operational level

Competency (1) : Maintenance and repair of electrical and electronicequipment

(**Safety requirements for working on shipboard electrical systems, including the safe isolation ofelectrical equipment required before personnel are permitted to work on such equipment)**

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate knowledge of Personal Protective Equipment(PPE) used on board for different tasks	Understanding , explanation and Proper use of PPE is satisfactory							
02	Demonstrate knowledge of the procedure to isolate and lock electrical equipment and apply necessary safety measures.	Understanding , and following of Proper safety during maintenance is satisfactory							
03	Identify the various hazardous areas on board your vessel and understand what electrical equipment can be fitted with in each of these zones.	Understanding and IS equipment selection is satisfactory.							
04	Demonstrate knowledge of special precautions to be taken for electrical equipment maintenance in hazardous areas.	Understanding , and following of Proper safety during maintenance is satisfactory							

Function (2): Maintenance and repair at the operational level

Competency (1): Maintenance and repair of electrical and electronic equipment

(**Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment. Detection of electric malfunction, location of faults and measures to prevent damage. Construction and operation of electrical testing and measuring equipment**)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
05	Demonstrate an ability to use and understand the limitations of common test equipment and instruments required for eachof the maintenance activities.	Strictly follow proper Testing and maintenance procedure.							
06	Demonstrate an ability to carry out routine testing and maintenance to a fluorescent light fitting and other lights	Strictly follow proper Testing and maintenance procedure.							
07	Demonstrate an ability to carry out routine testing and maintenance to the main emergency storage batteries	Strictly follow proper Testing and maintenance procedure.							
08	Demonstrate an ability to carry out the routine maintenanceand testing of an electric motor and its associated starter	Strictly follow proper Testing and maintenance procedure.							

Function (2): Maintenance and repair at the operational level

Competency (1) : Maintenance and repair of electrical and electronic equipment

(**Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment. Detection of electric malfunction, location of faults and measures to prevent damage. Construction and operation of electrical testing and measuring equipment**)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
09	Demonstrate an ability to carry out routine maintenance and testing of main switchboard circuit breakers	Strictly follow proper Testing and maintenance procedure.							
10	Demonstrate an ability to carry out routine electrical maintenance to generators	Strictly follow proper Testing and maintenance procedure.							
11	Demonstrate an ability to carry out routine electrical maintenance and testing of the emergency generator	Strictly follow proper Testing and maintenance procedure.							
12	Demonstrate an ability to locate low insulation of the 400 (440) V AC circuits	Strictly follow proper Testing and fault finding procedure.							
13	Demonstrate an ability to locate low insulation of the 230(110) V AC circuits	Strictly follow proper Testing and maintenance procedure.							

Function (2): Maintenance and repair at the operational level

Competency (1): Maintenance and repair of electrical and electronic equipment

(**Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment. Detection of electric malfunction, location of faults and measures to prevent damage. Construction and operation of electrical testing and measuring equipment**)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
14	Demonstrate an ability to locate low insulation of the 24 V DC circuits, supplied from storage batteries	Strictly follow proper Testing and maintenance procedure.							
15	Demonstrate an ability to carry out routine insulation test (megger test) of generators and all electrical equipment supplied from ship electrical system	Strictly follow proper Testing and maintenance procedure.							
16	Demonstrate an understanding of the PMS system on board	Understanding and explanation is satisfactory							
17	Understand the procedures for recording PlannedMaintenance System (PMS) activities on board	Understanding and explanation is satisfactory							
18	Demonstrate an ability to carry out the electrical maintenance to UPS units (where fitted)	Strictly follow proper Testing and maintenance procedure.							

Function (2): Maintenance and repair at the operational level

Competency (1): Maintenance and repair of electrical and electronic equipment

(Function and performance tests of the following equipment and their configuration: Monitoring systems, automatic control devices and protective devices)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
19	Demonstrate an ability to carry out the repair and final testingto machinery alarm system defects								
20	Demonstrate an ability to carry out routine testing and maintenance to fire detection systems								
21	Demonstrate an ability to monitor the operation, set andrecord parameters of PID controller								
22	Demonstrate an ability to check and align a PT100 unit orthermocouple								
23	Demonstrate an ability to check, calibrate, align and test apressure transmitter								

Function (2): Maintenance and repair at the operational level

Competency (1): Maintenance and repair of electrical and electronic equipment

(Function and performance tests of the following equipment and their configuration: Monitoring systems, automatic control devices and protective devices)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
24	Demonstrate an understanding of the operation of a valve remote control system	Understanding and explanation is satisfactory							
25	Understand the procedures for the change over operation of a control system into manual control	Understanding and explanation is satisfactory							
26	Demonstrate an ability to align and test a level transducer	Testing procedure satisfactory.							
27	Demonstrate an understanding of distributive control/instrumentation automation system (DCS/IAS)operations	Understanding, explanation and operation is satisfactory							

Function (2): Maintenance and repair at the operational level

Competency (1): Maintenance and repair of electrical and electronic equipment

(The interpretation of electrical and electronic diagrams)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
28	Demonstrate knowledge of different types of electrical diagrams and used symbols	Competency in diagram reading is satisfactory.							
29	Demonstrate an ability to interpret electrical diagrams	Competency in diagram reading is satisfactory.							
30	Demonstrate knowledge of different types of electronic diagrams and used symbols	Competency in diagram reading is satisfactory.							
31	Demonstrate an ability to interpret electronic diagrams	Competency in diagram reading is satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (2): Maintenance and repair of automation and controlsystems of main propulsion and auxiliary machinery

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an ability to carry out routine maintenance and repairs to the control equipment of main engine.	Maintenance, Troubleshooting and repair Satisfactory.							
02	Participate in carrying out the routine testing of the main engine safety trips and alarms	Testing procedure is satisfactory.							
03	Demonstrate an ability to carry out routine maintenance and repairs to the control equipment of auxiliary engines	Maintenance, Troubleshooting and repair Satisfactory.							
04	Demonstrate an ability to carry out routine testing and maintenance to the control systems of the boilers	Maintenance, Troubleshooting and repair Satisfactory.							
05	Demonstrate an ability to carry out routine testing and maintenance to the control systems of the air compressors	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (2) : Maintenance and repair of automation and controlsystems of main propulsion and auxiliary machinery

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
06	Demonstrate an ability to carry out routine testing and maintenance to the control systems of FO or LO purifiers	Maintenance, Troubleshooting and repair Satisfactory.							
07	Demonstrate an ability to carry out routine testing and maintenance to the control systems of the refrigeration or air condition compressors	Maintenance, Troubleshooting and repair Satisfactory.							
08	Demonstrate an ability to carry out routine testing and maintenance to the control systems of provision or cargo refrigerated chambers	Maintenance, Troubleshooting and repair Satisfactory.							
09	Demonstrate an ability to carry out routine testing and maintenance to the control systems of engine room crane	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (3): Maintenance and repair of bridge navigation equipmentand ship communication systems

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an ability to use common test equipment and instruments required for each of the maintenance activities.	Maintenance, Troubleshooting and repair Satisfactory.							
02	Demonstrate an ability to carry out routine maintenance to a radar system.	Maintenance, Troubleshooting and repair Satisfactory.							
03	Demonstrate an ability to carry out routine testing and maintenance to a navigation light	Maintenance, Troubleshooting and repair Satisfactory.							
04	Demonstrate an ability to carry out routine maintenance ofthe GMDSS equipment	Maintenance, Troubleshooting and repair Satisfactory.							
05	Demonstrate an ability to carry out routine testing or non-routine maintenance to the GPS receivers	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (3): Maintenance and repair of bridge navigation equipmentand ship communication systems

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
06	Demonstrate an ability to carry out routine testing or non-routine maintenance to the AIS or LRIT system	Maintenance, Troubleshooting and repair Satisfactory.							
07	Demonstrate an ability to carry out routine testing or non-routine maintenance to the echo sounder units	Maintenance, Troubleshooting and repair Satisfactory.							
08	Demonstrate an ability to carry out routine testing or non-routine maintenance to the speed log system	Maintenance, Troubleshooting and repair Satisfactory.							
09	Demonstrate an ability to carry out routine testing or non-routine maintenance to the voyage data recorder system	Maintenance, Troubleshooting and repair Satisfactory.							
10	Demonstrate an ability to carry out routine testing or non-routine maintenance to the gyro unit	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (3) : Maintenance and repair of bridge navigation equipmentand ship communication systems

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
11	Demonstrate an ability to carry out the routine testing of themain steering gear system from the bridge	Maintenance, Troubleshooting and repair Satisfactory.							
12	Demonstrate an ability to carry out routine testing or maintenance to the steering gear units within the steeringgear space	Maintenance, Troubleshooting and repair Satisfactory.							
13	Demonstrate an ability to carry out routine testing or maintenance to the main or emergency ship's whistle	Maintenance, Troubleshooting and repair Satisfactory.							
14	Demonstrate an ability to carry out routine testing or maintenance to the main MF/HF transceivers and aerialsystem	Maintenance, Troubleshooting and repair Satisfactory.							
15	Demonstrate an ability to carry out routine function testing or maintenance to the main satellite communication terminal	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (4): Maintenance and repair of electrical, electronic and controlsystems of deck machinery and cargo-handling equipment

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Participate in and demonstrate knowledge of the routine maintenance of anchor/ mooring winches and capstans	Maintenance, Troubleshooting and repair Satisfactory.							
02	Participate in and demonstrate knowledge of the routine maintenance of life boat launching devices	Maintenance, Troubleshooting and repair Satisfactory.							
03	Participate in and demonstrate knowledge of the routine maintenance of gangway lifting device	Maintenance, Troubleshooting and repair Satisfactory.							
04	Participate in and demonstrate knowledge of the routine maintenance of provision cranes	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (4): Maintenance and repair of electrical, electronic and controlsystems of deck machinery and cargo-handling equipment

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
05	Participate in and demonstrate knowledge of the routinemaintenance of hatch covers closing system	Maintenance, Troubleshooting and repair Satisfactory.							
06	Participate in and demonstrate knowledge of maintenanceand testing of cargo pumps, if applicable	Maintenance, Troubleshooting and repair Satisfactory.							
07	Participate in and demonstrate knowledge of maintenanceand testing of cargo steam stripping pumps	Maintenance, Troubleshooting and repair Satisfactory.							
08	Participate in and demonstrate knowledge of maintenance and testing of electrically driven ballast / anti- heeling pumps, including drive motor	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (4): Maintenance and repair of electrical, electronic and controlsystems of deck machinery and cargo-handling equipment

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
09	Participate in and demonstrate knowledge of maintenanceand testing of inert gas system, if applicable	Maintenance, Troubleshooting and repair Satisfactory.							
10	Participate in and demonstrate knowledge of the maintenance and testing of cargo handling cranes/ winches	Maintenance, Troubleshooting and repair Satisfactory.							
11	Demonstrate an ability to dismantle and reassemble one item of hazardous area equipment	Maintenance, Troubleshooting and repair Satisfactory.							
12	Demonstrate an ability to carry out the electrical maintenanceto watertight door or powered ramps (where fitted)	Maintenance, Troubleshooting and repair Satisfactory.							

Function (2): Maintenance and repair at the operational level

Competency (5): Maintenance and repair of control and safety systems of hotel equipment

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an ability to carry out routine electrical maintenance to galley and pantry equipment	Maintenance, Troubleshooting and repair Satisfactory.							
02	Demonstrate an ability to carry out the electrical maintenanceto laundry and hotel services	Maintenance, Troubleshooting and repair Satisfactory.							
03	Demonstrate an ability to carry out the electrical maintenanceto personal lift	Maintenance, Troubleshooting and repair Satisfactory.							
04	Demonstrate an ability to carry out the electrical maintenanceto provision lift	Maintenance, Troubleshooting and repair Satisfactory.							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (1): Ensure compliance with pollution-prevention requirements

(Knowledge of the precautions to be taken to prevent pollution of the marine environmentAnti-pollution procedures and all associated equipment Importance of proactive measures to protect the marine environment)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Participate in and demonstrate knowledge of the routine maintenance of bilge water separator	Understanding, Explanation and Operation is satisfactory.							
02	Participate in and demonstrate knowledge of the routine maintenance of sewage treatment unit	Understanding, Explanation and Operation is satisfactory.							
03	Participate in inspection and maintenance of ship incinerator burner, blower and combustion chamber	Understanding, Explanation and Operation is satisfactory.							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (1): Ensure compliance with pollution-prevention requirements

(Knowledge of the precautions to be taken to prevent pollution of the marine environmentAnti-pollution procedures and all associated equipment Importance of proactive measures to protect the marine environment)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
04	Demonstrate knowledge of the Company's rules regarding prevention of sea pollution	Understanding, Explanation and Operation is satisfactory.							
05	Demonstrate knowledge of procedures of collecting, sorting, storing and disposing of garbage (dry garbage, waste, glass, metal, plastics, oil containing liquids, etc.)	Understanding, Explanation and Operation is satisfactory.							
06	Demonstrate knowledge of ship equipment for handling and storing wastes	Understanding, Explanation and Operation is satisfactory.							
07	Demonstrate knowledge of procedures and actions in case ofpollution, or danger of pollution of the marine environment	Understanding, Explanation and Operation is satisfactory.							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (2): Prevent, control and fight fire on board

(Ability to organize fire drills Knowledge of classes and chemistry of fire Knowledge of fire-fighting systems Action to be taken in the event of fire, including fires involving oil systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate a knowledge of how to: 1)operate the fixed fire fighting system for accommodation,engine room, pump room/cargo spaces as applicable 2)operate automatic and manual fire flaps, fire doors, watertight doors, ventilation and air conditioning systems 3)operate emergency shut off valves, pump stops, mainengine stops start the main and emergency fire pumps and emergencygenerator	Understanding, Explanation and Operation is satisfactory.							
02	Demonstrate an ability to undertake the role of any emergency team member in an accommodation fire drill	Understanding, Explanation and Operation is satisfactory.							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (2): Prevent, control and fight fire on board

(Ability to organize fire drills Knowledge of classes and chemistry of fire Knowledge of fire-fighting systems Action to be taken in the event of fire, including fires involving oil systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
03	Demonstrate an ability to undertake the role of any emergency team member in an open deck oil/gas fire drill	Drill Activities is satisfactory.							
04	Demonstrate an ability to undertake the role of any emergency team member in a machinery space fire drill	Drill Activities is satisfactory.							
05	Demonstrate an ability to undertake the role of any emergency team member in a low visibility accommodation search and rescue drill	Drill Activities is satisfactory.							
06	Demonstrate an ability to undertake the role of any emergency team member wearing BA in a poor visibility accommodation or machinery space casualty search drill.	Drill Activities is satisfactory.							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (2): Prevent, control and fight fire on board

(Ability to organize fire drills Knowledge of classes and chemistry of fire Knowledge of fire-fighting systems Action to be taken in the event of fire, including fires involving oil systems)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
07	Demonstrate an ability to undertake the role of any emergency team member in an enclosed space casualtyrescue drill	Drill Activities is satisfactory.							
08	Demonstrate an ability to recharge a range of portable fire extinguishers	Drill Activities is satisfactory.							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (3): Operate life-saving appliances

(Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescueboats, their launching appliances and arrangements, and their equipment, including radio life- saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate an ability to perform effectively as a teammember displaying awareness for the safety of self and others at all times	Understanding, Explanation and Safe operation is satisfactory.							
02	Demonstrate an ability to communicate clearly with the bridge, other shipboard locations, team members, and others providing external assistance	Understanding, Explanation and Safe operation is satisfactory							
03	Demonstrate an ability to: -take charge of the preparation of survival craft and rescueboats for launching. -take charge of launching survival craft and rescue boats. -take charge of and handle survival craft and rescue boatsafter launching. -give appropriate orders for the preparation and launchingof survival craft and rescue boats. -instruct team members and passengers in abandonmentand survival procedures.	Understanding, Explanation and Safe operation is satisfactory							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (3): Operate life-saving appliances

(Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescueboats, their launching appliances and arrangements, and their equipment, including radio life- saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
04	Demonstrate an ability to: - locate and explain the correct procedure for operatingpyrotechnics and line throwing apparatus - locate and explain the correct procedure for operatingemergency radio equipment, EPIRB and SART	Understanding, Explanation and Safe operation is satisfactory							
05	Demonstrate an ability to undertake the role of any teammember in a man overboard drill	Understanding, Explanation and Safe operation is satisfactory							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (4): Apply medical first aid on board ship

(Practical application of medical guides and advice by radio, including the ability to take effectiveaction based on such knowledge in the case of accidents or illnesses that are likely to occur on board ship)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	During relevant drills : stop excessive bleeding, ensure breathing and put casualties in proper position, in compliance with accepted recommendations given in international medical first aid guidance	Understanding, Explanation is satisfactory							
02	During relevant drills : detect signs of shock and heat stroke and act accordingly requesting Medical Radio for advice	Understanding, Explanation is satisfactory							
03	During relevant drills : treat burns, scalds, fractures andhypothermia	Understanding, Explanation is satisfactory							
04	During relevant drills : locate and access shipboard medicine and equipment	Understanding, Explanation is satisfactory							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (5): Application of leadership and team working skills

(Working knowledge of shipboard personnel, management and trainingAbility to apply task and workload management Knowledge and ability to apply effective resource management Knowledge and ability to apply decision-making techniques)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Got acquainted with the systems of shipboard personnelmanagement and training	Understanding, Explanation is satisfactory							
02	Understand the importance and need for training aleadership and teamwork skills	Understanding, Explanation is satisfactory							
03	Demonstrate ability to effective communication on board and ashore	Understanding, Explanation is satisfactory							
04	Understand the need for planning the allocation of tasksincluding prioritization	Understanding, Explanation is satisfactory							
05	Observe results of effective management experience and skills of the crew	Understanding, Explanation is satisfactory							
06	In carrying out the tasks to acquire self-confidence and develop leadership skills	Understanding, Explanation is satisfactory							

Function (3): Controlling the operation of the ship and care for persons onboard at the operational level

Competency (6): Contribute to the safety of personnel and ship

(Knowledge of personal survival techniques Knowledge of fire prevention and ability to fight and extinguish firesKnowledge of elementary first aid Knowledge of personal safety and social responsibilities)

NO.	Task	Criteria for satisfactory performance	Ships ref no	Assignment completed				Type of Assessment	Remark
				Date	Confirmed By Qualified instructor	Date	Confirmed by Qualified Assessor		
01	Demonstrate the certificate of "Personal survival techniques" training	Knowledge and ability is satisfactory.							
02	Demonstrate the certificate of "Fire prevention and ability tofight and extinguish fires" training	Knowledge and ability is satisfactory.							
03	Demonstrate the certificate of "Elementary first aid" training	Knowledge and ability is satisfactory.							
04	Demonstrate the certificate of "Personal safety and social responsibilities" training	Knowledge and ability is satisfactory.							