

# Part A

## Course Framework

### ■ Scope

This **Marine Steam Turbine (MST)** course covers the mandatory competence and the required knowledge, understanding and proficiencies prescribed in Section A-III/2, Table A-III/2 of the STCW Code as amended, specifically on **marine steam turbine** including its machineries and associated auxiliaries.

This course requires a total of **thirty-two (32)** instructional hours to cover the topics enumerated in Part B - Course Outline.

### ■ Training Outcome

To meet the minimum standard of competences for all trainees assigned to shipboard duties on liquefied natural gas tankers propelled by steam turbine as required in Section A-III/2 of the STCW Code, this course is designed to enable the trainees to successfully demonstrate the competences on *Marine Steam Turbine*:

Specifically, at the end of the course the trainee must:

- manage the operation of propulsion plant machinery;
- plan and schedule operation; and
- manage the operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery;

### ■ Entry Standard

Entry to this course is open to all engine officers' holder of Certificate of Competency (COC) at the Operational Level with at least three (3) months seagoing service in that capacity.

## ■ Course Certificate

On successful compliance of the requirements of the course, a Certificate of Training Completion shall be issued as evidenced of fulfilling the mandatory minimum requirements and competences specifically on **marine steam turbine** including its machineries and associated auxiliaries as required in Regulation III/2 of the STCW Convention, 1978, as amended.

## ■ Course Intake Limitations

The number of trainees shall not exceed twelve (12) per class.

## ■ Staff Requirements

The course must have an Instructor, an Assessor and a Supervisor accredited by the Administration with the following qualifications:

### ***Instructor***

- holder of Certificate of Competency (COC) as Management Level Engine Officer;
- holder of a Certificate of Proficiency (COP) in Basic and Advanced Training for Liquefied Gas Tanker Cargo Operations;
- with at least one (1) year seagoing service in the Operational Level (or higher) on a liquefied gas tanker propelled by marine steam turbine;
- holder of Certificate of Training Completion in the Training Course for Instructors (IMO Model Course 6.09); and
- holder of Certificate of Training Completion in the Training Course of Train the Simulator Trainer and Assessor (IMO Model Course 6.10).

**Assessor:** The assigned assessor must possess the same qualifications of the instructor and in addition, must have a Certificate of Training Completion in the Training Course on Assessment, Examination and Certification of Seafarers (IMO Model Course 3.12).



## ■ Assessment

In determining the achievement of required competences in Column 1 of Table A-III/2, the assigned assessor shall be guided by the criteria for evaluating competence in Column 4, the Intended Learning Outcomes stipulated in the Course Syllabus and the assessment tasks enumerated in the Assessment Plan.

## ■ Teaching Facilities and Equipment

For theoretical and practical parts of the course, lectures and demonstrations shall be held in a classroom of with set of functional audio visual equipment. Classroom of 42 square meters with no side shall be less than 5 meters

For the conduct of practical exercises, the following facilities and equipment shall be available:

Item	Quantity
Simulator or computer sets with programs capable of: <ul style="list-style-type: none"> <li>operating the marine steam turbine propulsion plant</li> <li>performing plant up and plant down of main propulsion and auxiliary machinery</li> <li>operating limits of marine steam turbine propulsion plant</li> <li>conducting surveillance, performance assessment and maintaining safety of marine steam turbine propulsion</li> <li>troubleshooting common faults or alarms</li> </ul> <p>Note: Workstation to trainee ratio:</p> <ul style="list-style-type: none"> <li>1:4 (Simulator)</li> <li>1:2 (Computer set)</li> </ul>	6 + 1 (6 workstations and 1 instructor's station)  <i>The minimum number of workstation shall not be less than 4 units.</i>  <i>The intake limitations maybe adjusted accordingly following the prescribed workstation to trainee ratio.</i>
Briefing/debriefing room	1 room

**Note: All equipment must be labeled with MTI's name**

## ■ Teaching Aid (A)

A1 Visual Presentations

A2 Training videos related to the following:

- Introduction to Marine Steam Turbine
  - Working principle of impulse and reaction steam turbine
  - How marine steam turbine works?
  - The Rankine cycle
  - Working principle of marine boiler
- A3     Graph:
- Sea water temperature vs main condenser vacuum graph
  - Performance Curve Graph
- A4     Diagrams:
- Heat Balance Diagram
  - Control Mechanism of marine steam turbine
  - Piping system for warm up of marine steam turbine plant
  - Piping diagram related to the operation of marine steam turbine plant  
(such as: boiler feed water, condensate water, high pressure steam, reduced pressure steam, exhaust and dump steam, low pressure steam, clean drain, lubricating oil, cooling fresh water, sea water circulating, cooling sea water)
- A5     Checklist (Simulator familiarization)
- A6     Manufacturer's instruction manual for marine steam turbine
- A7     Exercise Sheet

*Note: Other titles of video materials may be used provided it has similar content.*

## ■ IMO Reference (R)

- R1     International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended, 2017 Edition
- R2     ISM Code, International Safety Management Code, 2018 Edition

*Note: MTIs may use additional references as deemed necessary to meet the intended learning outcomes of this training course*



## ■ Bibliography (B)

*The MTI's may choose from the following bibliography or they may use other references provided it has similar contents.*

- B1 Introduction to practical marine engineering, Alan L. Rowen, Raymond F. Gardner, Jose Femenia, David S. Chapman, Edwin G. Wiggi
- B2 Introduction to marine engineering 2<sup>nd</sup> edition, D.A Taylor
- B3 Marine Steam Engines and turbines 3<sup>rd</sup> edition, W.J Fox & S.C McBirnie
- B4 Engineering thermodynamics work and heat transfer (S.I UNITS), G.F.C. Rogers & Y.R Mayhew
- B5 Manufacture's instruction manual for marine steam turbine, A Shipyard

*Note: The MTIs shall provide at least two (2) bibliography of the latest edition for this course. Electronic publications may be accepted as alternatives to printed copies of latest edition and must be sourced from authorized publishers.*

## Part B

### Course Outline

MTI shall ensure that all trainees shall be given sufficient time to learn, understand and perform all aspects of this course. It is understood that the number of hours for demonstration/practical work specified in the table below is indicative. Training hours shall be extended depending on trainees' successful acquisition of the required competences.

Topics	Time Allotment (in hours)	
	Theoretical	Practical
Course Introduction	0.5	
<i>Competence: Manage the operation of propulsion plant machinery</i>		
1. Design features of marine steam turbine	0.5	
2. Operative mechanism of marine steam turbine	1.0	
<i>Competence: Plan and schedule operations</i> <i>Competence: Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</i>		
3. Thermodynamics and heat transmission in marine steam turbine propulsion plant	1.5	-
4. Mechanics and hydromechanics	1.0	-
5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption	1.5	-
6. Heat cycle, thermal efficiency and heat balance of marine steam turbine	1.5	-
7. Operating limits of marine steam turbine propulsion plant	2.0	2.0
8. Function and mechanism of automatic control for marine steam turbine propulsion plant	1.5	-



Topics	Time Allotment (in hours)	
	Theoretical	Practical
9. Operation of marine steam turbine plant	3.5	6.0
10. Plant up and Plant down of main propulsion and auxiliary machinery	0.5	6.0
11. Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant	1.0	2.0
<b>Sub-total</b>	<b>16.0</b>	<b>16.0</b>
<b>Total Training Hours</b>	<b>32.0</b>	
<b>Assessment Hours</b>		

**Note:**

*It is the responsibility of the MTI to determine the number of hours needed for the conduct of assessment both written and practical as maybe applicable taking into account the number of trainees, numbers of assessors, number of equipment, vis-à-vis the number of test items for written and the number of exercises for practical assessment.*

# Part C

## Course Syllabus

The course syllabus has been written in learning outcomes format in which the outcome describes what the trainee must do to demonstrate that the specified knowledge or skill has been acquired and the proper attitude has been developed. All the outcomes are understood to be prefixed by the words, "At the end of the session, the trainees should be able to ..."

Topics/Learning Outcomes	Reference/ Bibliography	Teaching Aid
<b>Course Introduction</b> .1 explain the provision in Regulation III/2 of the STCW Convention, 1978, as amended .2 explain the competences under Section A-III/2 of STCW Convention, 1978, as amended .3 explain the expected training outcomes	R1	A1, A2
<b>1. Design features of marine steam turbine</b> .1 differentiate impulse turbine and reaction turbine with respect to their: <ul style="list-style-type: none"> <li>• construction and design</li> <li>• utilization of steam energy</li> <li>• advantages and disadvantages</li> </ul>	R1, B3	A1, A2
<b>2. Operative mechanism of marine turbine</b> .1 explain the function of the following: <ul style="list-style-type: none"> <li>• high pressure turbine</li> <li>• low pressure turbine</li> <li>• astern turbine</li> <li>• astern guardian valve</li> <li>• maneuvering valve</li> </ul>	R1, B1, B2, B3	A1, A2
<b>3. Thermodynamics and heat transmission in marine steam turbine propulsion plant</b> .1 explain the application of thermodynamics and transmission in marine steam turbine propulsion plant .2 interpret the sea water temperature vs main condenser vacuum graph to	R1, B3, B4	A1, A3, A4



Topics/Learning Outcomes	Reference/ Bibliography	Teaching Aid
prepare for the operation of marine steam turbine propulsion plant		
<b>4. Mechanics and hydromechanics of steam</b> .1 explain the application of mechanics and hydromechanics in marine steam turbine propulsion plant	R1, B3, B4	A1, A2
<b>5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption</b> .1 compare the propulsive characteristic of marine steam turbine vs. diesel using performance curve graph in terms of: <ul style="list-style-type: none"> <li>• speed</li> <li>• output</li> <li>• fuel consumption</li> </ul>	R1, B5	A1, A3
<b>6. Heat cycle, thermal efficiency and heat balance of marine steam turbine propulsion plant</b> .1 explain the heat cycle, thermal efficiency and heat balance of marine steam turbine propulsion plant using heat balance diagram	R1, B3, B4	A1, A2, A4
<b>7. Operating limits of marine steam turbine propulsion plant</b> .1 explain the operating limits of marine steam turbine propulsion plant with respect to: <ul style="list-style-type: none"> <li>• pressure</li> <li>• temperature</li> <li>• revolution</li> <li>• speed</li> <li>• power output</li> <li>• torque</li> </ul> .2 check the operating limits of marine steam turbine propulsion plant during start up and warm up period in accordance with technical specification and agreed work plan .3 analyze the result form the checked parameters and take appropriate actions	R1, R2, B5	A1, A4, A5, A6, A7



Topics/Learning Outcomes	Reference/ Bibliography	Teaching Aid
<b>8. Function and mechanism of automatic control for marine steam turbine propulsion plant</b> .1 explain the function and mechanism of the following automatic controls: <ul style="list-style-type: none"> <li>• rpm control</li> <li>• program control</li> <li>• direct control</li> <li>• lever control</li> <li>• nozzle lift control</li> </ul>	R1, B5	A1, A4
<b>9. Operation of marine steam turbine propulsion plant</b> .1 explain the function of each component of marine steam turbine propulsion plant .2 explain the safety precautions in operating the marine steam turbine plant .3 explain the procedures for the following operations of marine steam turbine propulsion plant: <ul style="list-style-type: none"> <li>• arrival</li> <li>• departure</li> </ul> .4 operate marine steam turbine for the following operations using simulator: <ul style="list-style-type: none"> <li>• arrival</li> <li>• departure</li> </ul>	R1, R2, B2, B3, B5	A1, A2, A4, A5, A6, A7
<b>10. Plant up and Plant down of main propulsion and auxiliary machinery</b> .1 explain the procedures for plant up and plant down of main steam turbine propulsion plant in accordance with manufacturer's manual .2 plant up and plant down main steam turbine propulsion plant using simulator in accordance with manufacturer's manual	R1, R2	A1, A4, A5, A6, A7
<b>11. Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant</b> .1 explain the procedures in conducting surveillance and performance assessment to maintain safe operating condition	R1, B5	A1, A3, A4, A5, A6, A7



Topics/Learning Outcomes	Reference/ Bibliography	Teaching Aid
<ul style="list-style-type: none"><li>.2 conduct surveillance and performance assessment using the gathered data</li><li>.3 analyze the result of surveillance and performance assessment conducted and take appropriate actions in accordance with technical specifications and agreed work plan</li></ul>		

## Part D

### Instructor's Guide

<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> Manage the operation of propulsion plant machinery		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Design features and operative mechanism of the following machinery and associated auxiliaries: Marine steam turbine		
			<b>Topics:</b> <b>Course Introduction</b> <b>1. Design features of marine steam turbine</b>		
<b>No. of Trainees:</b> Twelve (12) Trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
30 minutes	<b>Course Introduction</b>	<ul style="list-style-type: none"> <li>House Rules and Regulations</li> <li>Regulation III/2 and Section A-III/2 of the STCW Convention, 1978, as amended</li> <li>Introduction to marine steam turbine</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Class orientation/ briefing</li> <li>Lecture-Discussion or other teaching methods suitable for theoretical aspect</li> <li>Presentation of the ILOs</li> </ul>	Listening, note taking, inquiring, answering questions, interactive discussion	<ul style="list-style-type: none"> <li>Visual Presentation</li> <li>Video presentation (Introduction to marine steam turbine)</li> </ul>



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
25 minutes	Core Elements	<b>1. Design features of marine steam turbine</b> <ul style="list-style-type: none"> <li>• parts of marine steam turbine</li> <li>• impulse and reaction steam turbines, including its: <ul style="list-style-type: none"> <li>- construction &amp; design</li> <li>- utilization of steam energy</li> <li>- advantages and disadvantage</li> </ul> </li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>• Visual presentation</li> <li>• Video presentation (working principle of impulse and reaction steam turbine)</li> <li>• Photo/illustration of impulse and reaction steam turbine</li> </ul>
5 minutes	Conclusion	<ul style="list-style-type: none"> <li>• Regulation III/2 and Section A-III/2 of the STCW Convention, 1978, as amended</li> <li>• Design features of marine steam turbine</li> </ul>	<ul style="list-style-type: none"> <li>• Make generalizations and abstraction about the lessons</li> <li>• Assess the learning which may come from any of the following: <ul style="list-style-type: none"> <li>- Formative Test</li> <li>- Oral Examination</li> <li>- Assignment</li> <li>- Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Participating, sharing insights and learning gained</li> <li>• Answering and asking</li> </ul>	Visual Presentation



<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> Manage the operation of propulsion plant machinery		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Design features and operative mechanism of the following machinery and associated auxiliaries: Marine steam turbine		
			<b>Topics:</b> <b>2. Operative mechanism of marine steam turbine</b>		
<b>No. of Trainees:</b> Twelve (12) Trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Design features of marine steam turbine</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of previous lesson</li> <li>Presentation of the ILOs or other activities to motivate the trainees</li> </ul>	Listening, note taking, answering questions, interactive discussion	Visual presentation
50 minutes	Core Elements	<b>2. Operative mechanism of the components of marine steam turbine:</b> <ul style="list-style-type: none"> <li>high pressure turbine</li> <li>low pressure turbine</li> <li>astern turbine</li> <li>astern guardian valve</li> <li>maneuvering valve</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Photo/illustration of marine steam turbine with its major components</li> </ul>



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Conclusion	Operative mechanism of marine steam turbine	<ul style="list-style-type: none"><li>• Make generalizations and abstraction about the lessons</li><li>• Assess the learning which may come from any of the following:<ul style="list-style-type: none"><li>- Formative Test</li><li>- Oral Examination</li><li>- Assignment</li><li>- Other activities to check the retention of learning</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Participate, share insights and learning gained</li><li>• Answering and asking</li></ul>	Visual Presentation

<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> <ul style="list-style-type: none"> <li>Theoretical knowledge on Thermodynamics and heat transmission</li> <li>Heat cycle, thermal efficiency and heat balance of the following: <ul style="list-style-type: none"> <li>2 marine steam turbine</li> </ul> </li> </ul>		
			<b>Topics:</b> <b>3. Thermodynamics and heat transmission in marine steam turbine propulsion plant</b>		
<b>No. of Trainees:</b> Twelve (12) Trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Operative mechanism of marine steam turbine</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of previous lesson</li> <li>Presentation of the ILOs or other activities to motivate the trainees</li> </ul>	Listening, note taking, answering questions, interactive discussion	Visual presentation

Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional
------	-------	---------	-------------------------	---------------------------	---------------



					<b>Materials Used</b>
1 hour and 20 minutes	<b>Core Elements</b>	<b>3. Thermodynamics and heat transmission in marine steam turbine propulsion plant</b> <ul style="list-style-type: none"> <li>principles of thermodynamics and heat transmission applied in marine steam turbine propulsion plant</li> <li>properties of steam</li> <li>steam cycle</li> <li>relationship of sea water temperature and main condenser vacuum</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Heat transmission diagram</li> <li>Sea water temperature vs main condenser vacuum graph</li> </ul>
5 minutes	<b>Conclusion</b>	Thermodynamics and heat transmission in marine steam turbine propulsion plant	<ul style="list-style-type: none"> <li>Make generalizations and abstraction about the lessons</li> <li>Assess the learning which may come from any of the following:               <ul style="list-style-type: none"> <li>Formative Test</li> <li>Oral Examination</li> <li>Assignment</li> <li>Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Participating, sharing insights and learning gained</li> <li>Answering and asking</li> </ul>	Visual Presentation



<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Theoretical knowledge on Mechanics and hydromechanics		
			<b>Topics:</b> <b>4. Mechanics and Hydromechanics</b>		
<b>No. of Trainees:</b> Twelve (12) Trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Thermodynamics and heat transmission in marine steam turbine propulsion plant</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of previous lesson</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	<ul style="list-style-type: none"> <li>Listening, note taking, answering questions, interactive discussion</li> </ul>	Visual presentation
50 minutes	Core Elements	<b>4. Mechanics and Hydromechanics</b> <ul style="list-style-type: none"> <li>The principles and applications of mechanics and hydromechanics applied in marine steam turbine</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Video presentation (How marine steam turbine works?)</li> </ul>



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Conclusion	Mechanics and Hydromechanics as applied in marine steam turbine	<ul style="list-style-type: none"><li>• Make generalizations and abstraction about the lessons</li><li>• Assess the learning which may come from any of the following:<ul style="list-style-type: none"><li>- Formative Test</li><li>- Oral Examination</li><li>- Assignment</li><li>- Other activities to check the retention of learning</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Participating, sharing insights and learning gained</li><li>• Answering and asking</li></ul>	Visual presentation

<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Propulsive characteristics of steam turbine, including speed, output and fuel consumption		
			<b>Topics:</b> <b>5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption</b>		
<b>No. of Trainees:</b> Twelve (12) Trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Mechanics and hydromechanics</li> <li>Intended Learning Outcomes (ILO)</li> </ul>	<ul style="list-style-type: none"> <li>Review of the previous lesson</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	<ul style="list-style-type: none"> <li>Listening, note taking, answering questions, interactive discussion</li> </ul>	Visual presentation
1 hour and 20 minutes	Core Elements	<b>5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption</b>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Performance graph curve (diesel vs. turbine)</li> </ul>
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional



					<b>Materials Used</b>
5 minute s	<b>Conclusion</b>	Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption	<ul style="list-style-type: none"> <li>• Make generalizations and abstraction about the lessons</li> <li>• Assess the learning which may come from any of the following: <ul style="list-style-type: none"> <li>- Formative Test</li> <li>- Oral Examination</li> <li>- Assignment</li> <li>- Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Participating, interactive discussion</li> <li>• Asking and answering</li> </ul>	Visual presentation

			<ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Theoretical knowledge on Heat cycle, thermal efficiency and heat balance of marine steam turbine		
			<b>Topics:</b> <b>6. Heat cycle, thermal efficiency and heat balance of marine steam turbine</b>		
<b>No. of Trainees:</b> Twelve (12) Trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Propulsive characteristics of marine steam turbine, including speed, output and fuel consumption</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of previous lesson</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	<ul style="list-style-type: none"> <li>Listening, note taking, answering questions, interactive discussion</li> </ul>	Visual presentation



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
1 hour and 20 minutes	Core Elements	<b>6. Heat cycle, thermal efficiency and heat balance of marine steam turbine propulsion plant</b> <ul style="list-style-type: none"> <li>Rankine cycle</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Heat Balance Diagram</li> <li>Video presentation (Rankine cycle)</li> </ul>
5 minutes	Conclusion	Heat cycle, thermal efficiency and heat balance of marine steam turbine	<ul style="list-style-type: none"> <li>Make generalizations and abstraction about the lessons</li> <li>Assess the learning which may come from any of the following:               <ul style="list-style-type: none"> <li>Formative Test</li> <li>Oral Examination</li> <li>Assignment</li> <li>Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Participating, sharing insights and learning gained</li> <li>Asking and answering</li> </ul>	<ul style="list-style-type: none"> <li>Visual presentation</li> </ul>



<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Operating limits of propulsion plant		
			<b>Topic:</b> <b>7. Operating limits of marine steam turbine propulsion plant</b>		
			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>No. of Trainees:</b> Twelve (12) trainees			<b>Formative Assessment:</b> Written and Practical Test		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only					
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Heat cycle, thermal efficiency and heat balance of marine steam turbine</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of the previous lesson</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	Listening, note taking, answering questions, interactive discussion	Visual presentation
1 hour and 50 minutes	Core Elements	<b>7. Operating limits of marine steam turbine propulsion plant</b> <ul style="list-style-type: none"> <li>warm up criteria (key instructions and piping system)</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Piping Diagram (warm up of marine steam turbine plant)</li> <li>Engine data sheet</li> </ul>



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
2 hours		Technical specification of marine steam turbine per agreed work plan	Practical Exercise	<ul style="list-style-type: none"> <li>Check the operating limits of marine steam turbine propulsion plant during start up and warm up period in accordance with technical specification and agreed work plan</li> <li>Analyze the result form the checked parameters and take appropriate actions</li> </ul>	<ul style="list-style-type: none"> <li>Exercise sheet</li> <li>Familiarization Checklist</li> <li>Simulator</li> <li>Manufacturer's instruction manual for marine steam turbine</li> </ul>
5 minutes	Conclusion	Operating limits of marine steam turbine propulsion plant	<ul style="list-style-type: none"> <li>Make generalizations and abstraction about the lessons</li> <li>Assess the learning which may come from any of the following:               <ul style="list-style-type: none"> <li>Formative Test</li> <li>Oral Examination</li> <li>Assignment</li> <li>Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Participating, sharing insights and learning gained</li> <li>Asking and answering</li> </ul>	Visual Presentation



<b>Course: Steam Turbine Engine Training Course</b>		<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>			
		<b>Knowledge, Understanding and Proficiency (KUP):</b> Functions and mechanism of automatic control for main engine			
		<b>Topics:</b> <b>8. Function and mechanism of automatic control for marine steam turbine propulsion plant.</b>			
<b>No. of Trainees:</b> Twelve (12) trainees		<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes			
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only		<b>Formative Assessment:</b> Written Test			
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Operating limits of marine steam turbine propulsion plant</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of the previous lessons</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	<ul style="list-style-type: none"> <li>Listening, note taking, answering questions, interactive discussion</li> </ul>	Visual presentation
1 hour and 20 minutes	Core Elements	<b>8. Function and mechanism of the following automatic controls for marine steam turbine propulsion plant:</b> <ul style="list-style-type: none"> <li>rpm control</li> <li>program control</li> <li>direct control</li> <li>lever control</li> <li>nozzle lift control</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Control mechanism (stop) diagram</li> </ul>



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Conclusion	Function and mechanism of automatic control for marine steam turbine propulsion plant	<ul style="list-style-type: none"><li>• Make generalizations and abstraction about the lessons</li><li>• Assess the learning which may come from any of the following:<ul style="list-style-type: none"><li>- Formative Test</li><li>- Oral Examination</li><li>- Assignment</li><li>- Other activities to check the retention of learning</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Participating, sharing insights and learning gained</li><li>• Asking and answering</li></ul>	Visual presentation

<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery		
			<b>Topics:</b> <b>9. Operation of marine steam turbine propulsion plant</b>		
<b>No. of Trainees:</b> Twelve (12) trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written and Practical Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Function and mechanism of automatic control for marine steam turbine propulsion plant</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of the previous lesson</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	Listening, note taking, answering questions, interactive discussion	Visual presentation
3 hours and 20 minutes	Core Elements	<b>9. Operation of marine steam turbine propulsion plant</b> <ul style="list-style-type: none"> <li>functions and locations of each component of marine steam turbine propulsion plant</li> </ul>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Video presentation (Working principle of marine boiler)</li> <li>Piping diagrams</li> </ul>
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials



					Used
		<ul style="list-style-type: none"> <li>• safety precautions in operating the marine steam turbine plant</li> <li>• procedures for arrival, in port and departure</li> </ul>			
6 hours		Arrival and departure operation of marine steam turbine	Practical exercise	Operate marine steam turbine for arrival and departure using a simulator	<ul style="list-style-type: none"> <li>• Exercise sheet</li> <li>• Simulator</li> <li>• Manufacturer's instruction manual for marine steam turbine</li> </ul>
5 minutes	<b>Conclusion</b>	Operation of marine steam turbine propulsion plant	<ul style="list-style-type: none"> <li>• Make generalizations and abstraction about the lessons</li> <li>• Assess the learning which may come from any of the following:               <ul style="list-style-type: none"> <li>- Formative Test</li> <li>- Oral Examination</li> <li>- Assignment</li> <li>- Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Participating, sharing insights and learning gained</li> <li>• Asking and answering</li> </ul>	Visual presentation

<b>Course: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> Start up and shut down main propulsion and auxiliary machinery, including associated systems		
			<b>Topics:</b> <b>10. Plant up and Plant down of main propulsion and auxiliary machinery</b>		
<b>No. of Trainees:</b> Twelve (12) trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written and Practical Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Operation of marine steam turbine</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of the previous lesson</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	Listening, note taking, answering questions, interactive discussion	Visual presentation
20 minutes	Core Elements	<b>10. Plant up and Plant down of marine steam turbine propulsion plant</b>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	Visual presentation



Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
6 hours		Plant up and plant down operation of marine steam turbine propulsion plant	Practical exercise	Plant up and plant down marine steam turbine propulsion plant in accordance with manufacturer's manual	<ul style="list-style-type: none"> <li>• Exercise Sheet</li> <li>• Simulator</li> <li>• Manufacturer's instruction manual for marine steam turbine</li> </ul>
5 minutes	<b>Conclusion</b>	Plant up and Plant down of main propulsion and auxiliary machinery	<ul style="list-style-type: none"> <li>• Make generalizations and abstraction about the lessons</li> <li>• Assess the learning which may come from any of the following: <ul style="list-style-type: none"> <li>- Formative Test</li> <li>- Oral Examination</li> <li>- Assignment</li> <li>- Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Participating, sharing insights and learning gained</li> <li>• Asking and answering</li> </ul>	Visual presentation

<b>Course Title: Steam Turbine Engine Training Course</b>			<b>Competence:</b> <ul style="list-style-type: none"> <li>Plan and schedule operations</li> <li>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</li> </ul>		
			<b>Knowledge, Understanding and Proficiency (KUP):</b> The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery		
			<b>Topics:</b> <b>11. Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant</b>		
<b>No. of Trainees:</b> Twelve (12) trainees			<b>Learning Outcomes:</b> At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes		
<b>Class Layout:</b> Class lay-out suitable for the theoretical part only			<b>Formative Assessment:</b> Written and Practical Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	<ul style="list-style-type: none"> <li>Plant up and plant down of main propulsion and auxiliary machinery</li> <li>Intended Learning Outcomes (ILOs)</li> </ul>	<ul style="list-style-type: none"> <li>Review of previous lessons</li> <li>Presentation of the ILOs or other activities to motivate trainees</li> </ul>	Listening, note taking, answering questions, interactive discussion	Visual presentation
50 minutes	Core Elements	<b>11. Surveillance and performance assessment and maintaining safety of marine steam turbine propulsion plant</b>	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with co-trainees, writing down notes	<ul style="list-style-type: none"> <li>Visual presentation</li> <li>Performance Curve Graph</li> </ul>
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional



					<b>Materials Used</b>
2 hours		Maintaining safe operation of marine steam turbine propulsion plant	Practical Exercise	<ul style="list-style-type: none"> <li>• Conduct surveillance and performance assessment using gathered data</li> <li>• Analyze the result of surveillance and performance assessment conducted and take appropriate action in accordance with technical specifications</li> </ul>	<ul style="list-style-type: none"> <li>• Exercise Sheet</li> <li>• Simulator</li> <li>• Manufacturer's instruction manual for marine steam turbine</li> </ul>
5 minutes	<b>Conclusion</b>	Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant	<ul style="list-style-type: none"> <li>• Make generalizations and abstraction about the lessons</li> <li>• Assess the learning which may come from any of the following:               <ul style="list-style-type: none"> <li>- Formative Test</li> <li>- Oral Examination</li> <li>- Assignment</li> <li>- Other activities to check the retention of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Participating, sharing insights and learning gained</li> <li>• Asking and answering</li> </ul>	Visual presentation

# Part E

## Course Assessment

### ■ Introduction

Assessment is concerned with making of proper judgment in the progress and development of the trainees' learning skills and attitudes. This means assessment is placing value or worth to behavior processes of doing things appropriate in a given situation on board. To be effective, however, the assessment requires that judgments be based on appropriate and relevant data. This is why the learning outcomes in Part C, are herein provided as the basis for the evaluation of trainees' progress, development and learning of this course.

### ■ Assessment Method

A written examination shall be administered in order to measure the acquired knowledge of the trainees. The examinations shall be administered at the end of training in which a passing mark is pre-requisite for the practical assessment.

To ensure representation of all topics covered in an objective type of test and to measure the desired level of thinking skills, the test items to be constructed shall be based on a Table of Specification (TOS). A sample TOS is provided with the number of test items indicated is to be used as a **GUIDE ONLY**.

On the other hand, a practical assessment shall be conducted to measure trainees' ability to demonstrate the following skills:

- plan and schedule operation; and
- manage the operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery.

Both methods of assessment used to measure the knowledge, skills and attitudes acquired by the trainees are reflected in the corresponding Assessment Plan. This document details the overall assessment strategy which includes the following information:

- when the assessment is to take place;
- what assessment methods are to be employed;
- the marks/weighting for each assessment;



- who is responsible for conducting the assessment;
- what resources are needed; and
- conditions under which assessments are to be conducted.

A sample of an Assessment Plan is provided with the number of test items and numbers of exercises for practical assessment indicated are to be used as a **GUIDE ONLY**.

**TABLE OF SPECIFICATION (TOS)**

Contents	Time Allotment	% of Teaching Time	Thinking Skills						No. of Test Items
			Remember	Understand	Apply	Analyze	Evaluate	Create	
Course Introduction	0.5 hr	1.7							
1. Design features of marine steam turbine	0.5 hr	1.7		2					2
2. Operative mechanism of marine turbine	1.0 hr	3.3		2					2
3. Thermodynamics and heat transmission in marine steam turbine propulsion plant	1.5 hrs	5.0		1					1
4. Mechanics and hydromechanics of steam	1.0 hr	3.3		1					1
5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption	1.5 hrs	5.0		1		1			2
6. Heat cycle, thermal efficiency and heat balance of marine steam turbine propulsion plant	1.5 hrs	5.0		2					2



Contents	Time Allotment	% of Teaching Time	Thinking Skills						No. of Test Items
			Remember	Understand	Apply	Analyze	Evaluate	Create	
7. Operating limits of marine steam turbine propulsion plant	2.0 hrs	6.7		1		1			2
8. Function and mechanism of automatic control for marine steam turbine propulsion plant	1.5 hrs	5.0		2					2
9. Operation of marine steam turbine propulsion plant	9.5 hrs	31.7		6	2				8
10. Plant up and Plant down of main propulsion and auxiliary machinery	8.5 hrs	28.3		4	2				6
11. Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant	1.0 hr	3.3		1		1			2
<b>Total</b>	<b>30 hrs</b>	<b>100</b>		<b>23</b>	<b>4</b>	<b>3</b>			<b>30</b>

## ASSESSMENT PLAN

STCW Code: Section A-III/2					Table:		Table A-III/2				
Approved Training Program: MARINE STEAM TURBINE					Instructor:					Date Prepared:	
Resources Needed					Assessor:					Approved by:	
Topics	Written Assessment				Practical Assessment						Grading Scheme
	No. of Test Items	Assessment Method	Assessment Period	Grading Scheme	Assessment Task						
					<ul style="list-style-type: none"><li>Check the operating limits of marine steam turbine propulsion plant during start up and warm up period</li><li>Analyze the result form the checked parameters and take appropriate actions</li></ul>	Operate the marine steam turbine for the following operations: <ul style="list-style-type: none"><li>Arrival</li><li>Departure</li></ul>	Perform plant up and plant down of main steam turbine propulsion plant	<ul style="list-style-type: none"><li>Conduct surveillance and performance assessment using the gathered data</li><li>Analyze the result of surveillance and performance assessment conducted and take appropriate actions in accordance with technical specifications and agreed work plan</li></ul>			
Assessment Criteria											
Course Introduction	-	Multiple Choice Questions	Written exam is administered at the end of training period	Obtain at least 70% mark from written test.	Checks of pressures, temperatures and revolutions during the start-up and warm-up period are in accordance with technical specifications and agreed work plans	The methods of preparing for the startup and of making available fuels, lubricants, cooling water and air are the most appropriate	The methods of preparing for the startup and of making available fuels, lubricants, cooling water and air are the most appropriate	Surveillance and performance assessment of main propulsion plant and auxiliary systems is sufficient to maintain safe operating conditions	Successfully meeting all Assessment Criteria		
1. Design features of marine steam turbine	2										
2. Operative mechanism of marine turbine	2					The methods of preparing the shutdown and of supervising the cooling down of the engine are the most appropriate	The methods of preparing the shutdown and of supervising the cooling down of the engine are the most appropriate				
3. Thermodynamics and heat transmission in marine steam turbine propulsion plant	1					The methods of measuring the load capacity of the engines are in accordance with technical specifications	The methods of measuring the load capacity of the engines are in accordance with technical specifications				
4. Mechanics and hydromechanics of steam	1						Performance is checked against				



STCW Code: Section A-III/2					Table:		Table A-III/2		
Approved Training Program: MARINE STEAM TURBINE					Instructor:			Date Prepared:	
Resources Needed					Assessor:			Approved by:	
Topics	Written Assessment				Practical Assessment				Grading Scheme
	No. of Test Items	Assessment Method	Assessment Period	Grading Scheme	Assessment Task				
					<ul style="list-style-type: none"> <li>Check the operating limits of marine steam turbine propulsion plant during start up and warm up period</li> <li>Analyze the result from the checked parameters and take appropriate actions</li> </ul>	Operate the marine steam turbine for the following operations: <ul style="list-style-type: none"> <li>Arrival</li> <li>Departure</li> </ul>	Perform plant up and plant down of main steam turbine propulsion plant	<ul style="list-style-type: none"> <li>Conduct surveillance and performance assessment using the gathered data</li> <li>Analyze the result of surveillance and performance assessment conducted and take appropriate actions in accordance with technical specifications and agreed work plan</li> </ul>	
5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption	2					Performance is checked against bridge orders Performance levels are in accordance with technical specifications	bridge orders Performance levels are in accordance with technical specifications		
6. Heat cycle, thermal efficiency and heat balance of marine steam turbine propulsion plant	2								
7. Operating limits of marine steam turbine propulsion plant	2								
8. Function and mechanism of automatic control for marine steam turbine propulsion plant	2								

STCW Code: Section A-III/2					Table:		Table A-III/2		
Approved Training Program: MARINE STEAM TURBINE					Instructor:			Date Prepared:	
Resources Needed					Assessor:			Approved by:	
Topics	Written Assessment				Practical Assessment				Grading Scheme
	No. of Test Items	Assessment Method	Assessment Period	Grading Scheme	Assessment Task				
					<ul style="list-style-type: none"> <li>Check the operating limits of marine steam turbine propulsion plant during start up and warm up period</li> <li>Analyze the result form the checked parameters and take appropriate actions</li> </ul>	Operate the marine steam turbine for the following operations: <ul style="list-style-type: none"> <li>Arrival</li> <li>Departure</li> </ul>	Perform plant up and plant down of main steam turbine propulsion plant	<ul style="list-style-type: none"> <li>Conduct surveillance and performance assessment using the gathered data</li> <li>Analyze the result of surveillance and performance assessment conducted and take appropriate actions in accordance with technical specifications and agreed work plan</li> </ul>	
9. Operation of marine steam turbine propulsion plant	8								
10. Plant up and Plant down of main propulsion and auxiliary machinery	6								
11. Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant	2								
<b>Total</b>	<b>30</b>								