Part D
Instructor's Guide

Instructions: *The Instructor's Guide (I.G.) also known as lesson plan is developed by the instructor which serves as a road map of what the trainees need to learn and how it will be done effectively. The format below shall be used to ensure uniformity. However, the MTI is required to specify teaching and learning activities, and develop appropriate Instructional Materials suitable for the learning outcomes.*

<table>
<tr><td rowspan="4">Course: Management Level Course for Marine Engineer Officers (Function 1)</td><td colspan="4">Competence: Manage the operation of propulsion plant machinery</td></tr>
<tr><td colspan="4">Knowledge, Understanding and Proficiency:
• Design features, and operative mechanism of the following machinery and associated auxiliaries:
.1 marine diesel engine
.2 marine steam turbine
.3 marine gas turbine
.4 marine steam boiler</td></tr>
<tr><td colspan="4">Topics:
Course Introduction
1. Design features, and operative mechanism of marine diesel engine, marine steam turbine, marine gas turbine, and marine steam boiler</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>No. of Trainees: Twenty-Four (24) Trainees</td><td colspan="4">Learning Outcome/s: At the end of the session, the trainees should be able to:
Refer to Part C Course Syllabus for the Intended Learning Outcomes</td></tr>
<tr><td>Class Layout: Layout suitable for theoretical part</td><td colspan="4">Formative Assessment: Written Test</td></tr>
<tr><td>Time</td><td>Phase</td><td>Content</td><td>Instructor-led Activity</td><td>Trainee's Learning Activity</td><td>Instructional Materials Used</td></tr>
<tr><td>30 minutes</td><td>Introduction</td><td>Course Introduction
• Requirements under Regulation III/2 and Section A-III/2 Function</td><td>• Class orientation/ briefing</td><td>Listening, note taking, inquiring, answering</td><td>Visual presentation</td></tr>
</table>

		1 of the STCW Convention and Code • Training outcomes and course requirements • Intended Learning Outcomes • Introduction to leadership skill that a management level officer should possess	• Lecture/Discussion or other teaching methods suitable for theoretical aspect • Presentation of the ILOs or other activities to motivate the trainees	questions, interactive discussion	
3 hours and 45 minutes	**Core Elements**	**1. Design features and operating mechanism of propulsion machinery** .1 Design features and operative mechanism of the following machinery and associated auxiliaries: - marine diesel engine - marine steam turbine • Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption - marine gas turbine - marine steam boiler	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample operation manual
15 minutes	**Conclusion**	Design features, and operative mechanism of marine diesel engine, marine steam turbine, marine gas turbine, and marine steam boiler	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

			• Other activities to check the retention of learning		

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence:** Plan and schedule operations **Knowledge, Understanding and Proficiency:** *Practical knowledge* • Start up and shut down main propulsion and auxiliary machinery, including associated systems **Topic:** 2. Planning the start-up and shut down of main and auxiliary machinery, including associated system 2.1 Prior departure 2.2 Prior arrival
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Design features, and operative mechanism of marine diesel engine, marine steam turbine, marine gas turbine, and marine steam boiler • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
1 hour and 30 minutes	**Core Elements**	**2. Planning the start-up and shut down of main and auxiliary machinery, including associated system** 2.1 Prior departure 2.1.1 Legislative Requirements	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample instruction manual

		.1 Applicable legislative requirements and general company requirements necessary prior departure			
5 hours		***Practical Exercise 1:*** Supervise the function test of all critical equipment and machinery	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in supervising the function test of all critical equipment and machinery based on general company requirements and instruction manual.	***Practical Exercise:*** Participate in the practical exercise on supervising the function test of all critical equipment and machinery based on general company requirements and instruction manual.	• Simulator • Familiarization checklist • Exercise Sheet A7.1
2 hours		.3 Reportorial requirements prior arrival	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic
2 hours		2.1.2 Planning the operational requirements of main machinery (Diesel Engine) and associated systems .1 Factors that must be considered in the start-up of diesel engine			
1 hour		***Practical Exercise 2:***	***Practical Exercise:***	***Practical Exercise:***	• Sample Daily Work Order

		Plan the starting up of main diesel engine and associated systems	The MTI is required to specify suitable activities for the conduct of the practical exercise in planning the starting up of main diesel engine and associated systems in accordance with general company requirements in a given scenario.	Participate in the practical exercise on planning the starting up of main diesel engine and associated systems in accordance with general company requirements in a given scenario.	• Exercise Sheet A7.2
4 hours		.2 Prior arrival 2.2.1 Legislative Requirements .1 Applicable legislative requirements and general company requirements necessary prior arrival .2 Reportorial requirements prior arrival	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic
2 hours		2.2.2 Planning the operational requirements of main machinery (Diesel Engine) and associated systems .1 Factors that must be considered in shutting down the diesel engine and			

		associated systems			
1 hour		***Practical Exercise 3:*** Plan the shutting down of diesel engine and associated systems	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in planning the shutting down of diesel engine and associated systems in accordance with general company requirements in a given scenario.	***Practical Exercise:*** Participate in the practical exercise on planning the shutting down of diesel engine and associated systems in accordance with general company requirements in a given scenario.	• Sample Daily Work Order • Exercise Sheet A7.3
15 minutes	**Conclusion**	Planning the start-up and shut down of main and auxiliary machinery, including associated system	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence:** Plan and schedule operations **Knowledge, Understanding and Proficiency:** *Practical knowledge* • The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery **Topic:** 3 Planning of efficient operation and performance assessment of propulsion plant and auxiliary machinery 3.1Efficient Operation 3.2Performance Assessment
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Planning the start-up and shut down of main and auxiliary machinery, including associated system • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
1 hour and 30 minutes	**Core Elements**	**3. Planning of efficient operation and performance assessment of propulsion plant and auxiliary machinery** 3.1 Efficient Operation .1 Ship's Energy Efficiency Management Plan (SEEMP)	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Ship's Energy Efficiency Management Plan (SEEMP)

1 hour		***Practical Exercise 4:*** Plan a ship's energy efficiency	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in planning the ship's energy efficiency in accordance with company Ship's Energy Efficiency Management Plan (SEEMP) in a given scenario.	***Practical Exercise:*** Participate in the practical exercise on planning the ship's energy efficiency in accordance with company Ship's Energy Efficiency Management Plan (SEEMP) in a given scenario.	• Exercise Sheet A7.4 • Sample Ship's Energy Efficiency Management Plan (SEEMP)
2 hours		3.2 Performance Assessment .1 Methods of planning a performance assessment of main propulsion plant and auxiliary machinery	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic
1 hour		***Practical Exercise 5:*** Plan the performance assessment of main propulsion plant and auxiliary machinery	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in planning the performance assessment of main propulsion plant and auxiliary machinery in accordance with company requirements in a given scenario.	***Practical Exercise:*** Participate in the practical exercise on planning the performance assessment of main propulsion plant and auxiliary machinery in accordance with company requirements in a given scenario.	• Sample Daily Work Order • Sample Ship's Energy Efficiency Management Plan (SEEMP) • Sample Bunker Saving Plan • Exercise Sheet A7.5
15 minutes	**Conclusion**	Planning of efficient operation and performance assessment of propulsion plant and auxiliary machinery	• Make generalization and abstraction of the lesson	• Participating, sharing insights and learning gained	Visual Presentation

			• Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Answering/asking questions	

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence:** Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery **Knowledge, Understanding and Proficiency:** *Practical knowledge* • Start up and shut down main propulsion and auxiliary machinery, including associated systems **Topic:** 4. Start up and shut down main propulsion and auxiliary machinery, including associated systems 4.1 Start-up of Main Diesel Engine and auxiliary machinery including associated systems 4.2 Shutting down of Main Diesel Engine and auxiliary machinery including associated systems
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Planning the start-up and shut down of main and auxiliary machinery, including associated system and Planning of efficient operation and performance assessment of propulsion plant and auxiliary machinery • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
3 hours and 30 minutes	**Core Elements**	**4. Start up and shut down main propulsion and auxiliary machinery, including associated systems**	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation

		4.1 Start-up of Main Diesel Engine and auxiliary machinery including associated systems .1 Proper management in preparing for the start-up of main diesel engine .2 Process of determining the availability of fuels, lubricants, cooling water, and air			• Training video related to the topic • Sample Operation and Manufacturer's Manual
3 hours 3 hours		***Practical Exercises 6 and 7:*** • Manage the preparation of main diesel engine for the start-up and making available fuels, lubricants, cooling water, and air • Supervise the checking of the pressures, temperatures, and revolutions during the start-up and warm-up period	***Practical Exercises:*** The MTI is required to specify suitable activities for the conduct of the practical exercises in: • managing the preparation of main diesel engine for the start up and make available fuels, lubricants, cooling water, and air in accordance with company requirements in a given scenario • supervising the checking of the pressures, temperatures, and revolutions during the start-up and warm-up	***Practical Exercises:*** Participate in the practical exercises on: • managing the preparation of main diesel engine for the start up and make available fuels, lubricants, cooling water, and air in accordance with company requirements in a given scenario • supervising the checking of the pressures, temperatures, and revolutions during the start-up and warm-up period in accordance with safe working	• Simulator • Exercise Sheet A7.6 • Exercise Sheet A7.7

			period in accordance with safe working practices and agreed work plans through a given scenario	practices and agreed work plans through a given scenario	
2 hours		.5 Procedure for conducting surveillance of main diesel engine and its associated auxiliary	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation
3 hours		***Practical Exercise 8:*** Conduct surveillance of main diesel engine and its associated auxiliary systems	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in conducting surveillance of main diesel engine and its associated auxiliary systems to maintain safe operating conditions in accordance with company requirements through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on conducting surveillance of main diesel engine and its associated auxiliary systems to maintain safe operating conditions in accordance with company requirements through a given scenario.	• Simulator • Exercise Sheet A7.8
2 hours		.7 Procedure in checking the performance of main diesel engine and associated systems	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual

3 hours		***Practical Exercise 9:*** Check the performance of main diesel engine and associated system	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in checking the performance of main diesel engine and associated system in accordance with bridge orders and technical specifications through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on checking the performance of main diesel engine and associated system in accordance with bridge orders and technical specifications through a given scenario.	• Simulator • Exercise Sheet A7.9
2 hours		4.2 Shutting down of Main Diesel Engine and auxiliary machinery including associated systems .1 Proper management in preparing for the shut-down of main diesel engine	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual
3 hours		***Practical Exercise 10:*** Supervise the preparation of the main diesel engine for the shutting and cooling down operation	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in supervising the preparation of the main diesel engine for the shutting and cooling down operation in accordance with company requirements through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on supervising the preparation of the main diesel engine for the shutting and cooling down operation in accordance with company requirements through a given scenario.	• Simulator • Exercise Sheet A7.10

2 hours		.3 Procedure in conducting surveillance of the shutting down of main diesel engine and its associated auxiliary systems	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual
3 hours		***Practical Exercise 11:*** Conduct surveillance of the shutting down of main diesel engine and its associated systems	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in conducting surveillance of the shutting down of main diesel engine and its associated auxiliary systems to maintain safe operating conditions in accordance with company requirements through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on conducting surveillance of the shutting down of main diesel engine and its associated auxiliary systems to maintain safe operating conditions in accordance with company requirements through a given scenario.	• Simulator • Exercise Sheet A7.11
15 minutes	**Conclusion**	Start up and shut down main propulsion and auxiliary machinery, including associated systems	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence 3:** Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Knowledge, Understanding and Proficiency: *Practical knowledge* • Operating limits of propulsion plant
	Topic: 5. Operating Limits of Propulsion Plant
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Start up and shut down main propulsion and auxiliary machinery, including associated systems • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
2 hours	**Core Elements**	**5. Operating Limits of Propulsion Plant** .1 Factors to be considered in specifying the operating limits of propulsion plant	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual

3 hours		***Practical Exercise 12:*** Supervise the checking of the condition of the main diesel engine if within operating limits	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in supervising the checking of the condition of the main diesel engine if within the operating limits through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on supervising the checking of the condition of the main diesel engine if within the operating limits through a given scenario.	• Simulator • Exercise Sheet A7.12
15 minutes	**Conclusion**	Operating Limits of Propulsion Plant	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence 3:** Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Knowledge, Understanding and Proficiency: *Practical knowledge* • The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Topic: 6. The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Operating Limits of Propulsion Plant • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
1 hour and 30 minutes	**Core Elements** **Conclusion**	**6. The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery** .1 Conduct of surveillance in checking the efficient operation of main diesel engine and auxiliary machinery	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual

3 hours		***Practical Exercise 13:*** Conduct surveillance in checking the efficient operation of main diesel engine and auxiliary machinery	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in conducting surveillance in checking the efficient operation of main diesel engine and auxiliary machinery in accordance with technical specifications through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on conducting surveillance on checking the efficient operation of main diesel engine and auxiliary machinery in accordance with technical specifications through a given scenario.	• Simulator • Exercise Sheet A7.13
2 hours		.3 Methods of assessing performance of main diesel engine and auxiliary machinery	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual
3 hours		***Practical Exercise 14:*** Assess the performance of main diesel engine and auxiliary machinery	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in assessing the performance of main diesel engine and auxiliary machinery in accordance with technical specifications through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on assessing the performance of main diesel engine and auxiliary machinery in accordance with technical specifications through a given scenario.	• Simulator • Exercise Sheet A7.14

2 hours		.5 Methods of measuring the load capacity of main diesel, engine and auxiliary machinery	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual
3 hours		***Practical Exercise 15:*** Verify the load capacity of main diesel engine and auxiliary machinery using various methods	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in verifying the load capacity of main diesel engine and auxiliary machinery using various methods in accordance with technical specifications through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on verifying the load capacity of main diesel engine and auxiliary machinery using various methods in accordance with technical specifications through a given scenario.	• Simulator • Exercise Sheet A7.15
2 hours		.7 Frequency of surveillance of main diesel engine and auxiliary systems to maintain safe operating conditions	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual
2 hours		.8 Methods of maintaining safety of main diesel engine and auxiliary machinery			

3 hours		***Practical Exercise 16:*** Supervise the operation of the main diesel engine and auxiliary machinery to maintain safety	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in supervising the operation of the main diesel engine and auxiliary machinery to maintain safety in accordance with safe working practices and technical specifications through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on supervising the operation of the main diesel engine and auxiliary machinery to maintain safety in accordance with safe working practices and technical specifications through a given scenario.	• Simulator • Exercise Sheet A7.16
15 minutes		The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence:** Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Knowledge, Understanding and Proficiency: *Practical knowledge* • Functions and mechanism of automatic control for main engine
	Topic: 7. Functions and Mechanism of Automatic Control for Main Engine 7.1 Diesel Engine
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
3 hours and 30 minutes	**Core Elements**	**7. Functions and Mechanism of Automatic Control for Main Engine** 7.1 Diesel Engine .1 Function and mechanism of automatic control of main engine .2 Method in conducting surveillance and performance check of	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and Manufacturer's Manual

		automatic control system for main engine			
3 hours		**Practical Exercise 17:** Supervise the conduct of surveillance and performance check of automatic control system for main engine to maintain safe operation conditions	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in supervising the conduct of surveillance and performance check of automatic control system for main engine to maintain safe operating conditions in accordance with manufacturer's manual through a given scenario.	***Practical Exercise:*** Participate in the practical exercise on supervising the conduct of surveillance and performance check of automatic control system for main engine to maintain safe operating conditions in accordance with manufacturer's manual through a given scenario.	• Simulator • Exercise Sheet A7.17
15 minutes	**Conclusion**	Functions and Mechanism of Automatic Control for Main Engine	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence:** Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Knowledge, Understanding and Proficiency: *Practical knowledge* • Functions and mechanism of automatic control for auxiliary machinery including but not limited to generator distribution systems, steam boilers, oil purifier, refrigeration system, pumping and piping systems, steering gear system, and cargo-handling equipment and deck machinery
	Topic: 8. Functions and Mechanism of Automatic Control for Auxiliary Machinery
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Functions and Mechanism of Automatic Control for Main Engine • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
4 hours and 30 minutes	**Core Elements**	**8. Functions and Mechanism of Automatic Control for Auxiliary Machinery** .1 Functions and mechanism of automatic control for the following auxiliary machinery to maintain safe operating conditions:	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic • Sample Operation and

		- generator distribution systems - steam boilers - oil purifier - refrigeration system - pumping and piping systems - cargo-handling equipment and deck machinery .2 Method in conducting surveillance and performance check of automatic control for the following auxiliary machinery to maintain safe operating conditions: - generator distribution systems - steam boilers - oil purifier - refrigeration system - pumping and piping systems - cargo-handling equipment and deck machinery			Manufacturer's Manual
3 hours		***Practical Exercise 18:*** Supervise the conduct of surveillance and performance check of automatic control for generator distribution systems, steam boilers, oil purifier, refrigeration system, pumping and piping systems, and cargo-handling equipment and deck	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in supervising the conduct of surveillance and performance check of automatic control for	***Practical Exercise:*** Participate in the practical exercise on supervising the conduct of surveillance and performance check of automatic control for generator distribution systems, steam boilers, oil	• Simulator • Exercise Sheet A7.18

		machinery to maintain safe operating conditions	generator distribution systems, steam boilers, oil purifier, refrigeration system, pumping and piping systems, and cargo-handling equipment and deck machinery to maintain safe operating conditions through a given scenario.	purifier, refrigeration system, pumping and piping systems, and cargo-handling equipment and deck machinery to maintain safe operating conditions through a given scenario.	
15 minutes	**Conclusion**	Functions and Mechanism of Automatic Control for Auxiliary Machinery	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competences:** • Plan and schedule operations • Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Knowledge, Understanding and Proficiency: • Operating limits of propulsion plant • Functions and mechanism of automatic control for main engine • The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
	Topic: 9. Marine Steam Turbine 9.1 Operating limits of marine steam turbine propulsion plant 9.2 Function and mechanism of automatic control for marine steam turbine propulsion plant 9.3 Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Functions and Mechanism of Automatic Control for Auxiliary Machinery • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
1 hour and 30 minutes	**Core Elements**	**9. Marine Steam Turbine** 9.1 Operating limits of marine steam turbine propulsion plant .1 warm up criteria (key instructions and piping system)	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Piping Diagram (warm up of marine steam turbine plant)

					• Engine data sheet
2 hours and 30 minutes		***Practical Exercises 19 and 20:*** Technical specification of marine steam turbine per agreed work plan • Check the operating limits of marine steam turbine propulsion plant during start up and warm up period • Analyze the result from the checked parameters and taking appropriate actions	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercises in: • checking 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 • analysing the result from the checked parameters and taking appropriate actions.	***Practical Exercise:*** Participate in the practical exercises on: • checking 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 • analyzing the result from the checked parameters and taking appropriate actions.	• Simulator/computer set • Familiarization checklist • Manufacturer's instruction manual for marine steam turbine • Exercise Sheet A7.19 • Exercise Sheet A7.20
1 hour and 30 minutes		9.2 Function and mechanism of automatic control for marine steam turbine propulsion plant - rpm control - program control - direct control - lever control - nozzle lift control	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Diagram of control Mechanism of marine steam turbine
1 hour		9.3 Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant .1 Procedures in conducting surveillance and			• Visual Presentation • Performance curve graph

		performance assessment to maintain safe operating condition			
2 hours		***Practical Exercises 21 and 22:*** Maintaining safe operation of marine steam turbine propulsion plant • Conduct surveillance and performance assessment using the gathered data • Analyze the result of surveillance and performance assessment conducted and taking appropriate actions	***Practical Exercises:*** The MTI is required to specify suitable activities for the conduct of the practical exercises in: • conducting surveillance and performance assessment using the gathered data • analysing the result of surveillance and performance assessment conducted and take appropriate actions in accordance with technical specifications and agreed work plan.	***Practical Exercises:*** Participate in the practical exercises on: • conducting surveillance and performance assessment using the gathered data • analyzing the result of surveillance and performance assessment conducted and take appropriate actions in accordance with technical specifications and agreed work plan.	• Simulator/computer set • Manufacturer's instruction manual for marine steam turbine • Exercise Sheet A7.21 • Exercise Sheet A7.22
15 minutes	**Conclusion**	Marine Steam Turbine	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation

Course: Management Level Course for Marine Engineer Officers (Function 1)	**Competence:** Manage fuel, lubrication and ballast operations **Knowledge, Understanding and Proficiency:** • Operation and maintenance of machinery, including pumps and piping systems **Topic:** 10. Operation and maintenance of machinery, including pumps and piping system
No. of Trainees: Twenty-Four (24) Trainees	**Learning Outcome/s:** At the end of the session, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes
Class Layout: Layout suitable for theoretical part	**Formative Assessment:** Written and Practical Test

Time	Phase	Content	Instructor-led Activity	Trainee's Learning Activity	Instructional Materials Used
15 minutes	**Introduction**	• Functions and Mechanism of Automatic Control for Auxiliary Machinery • Intended Learning Outcomes	• Review of previous lessons • Presentation of the ILOs	Listening, note taking, inquiring, answering questions, interactive discussion	Visual presentation
1 hour and 30 minutes	**Core Elements**	**10. Operation and maintenance of machinery, including pumps and piping system** .1 Operational requirements in carrying out fuel and ballast operations	The MTI is required to specify suitable activities for the delivery of the topic.	The MTI is required to specify suitable learning activities.	• Visual Presentation • Training video related to the topic
3 hours		***Practical Exercise 23:*** Manage the carrying out of fuel and ballast operations	***Practical Exercise:*** The MTI is required to specify suitable activities for the conduct of the practical exercise in managing the carrying out of fuel and	***Practical Exercise:*** Participate in the practical exercise on managing the carrying out of fuel and ballast operations in accordance with safe	• Simulator • Exercise A7.23

			ballast operations in accordance with safe working practices so as to prevent pollution of the marine environment through a given scenario.	working practices so as to prevent pollution of the marine environment through a given scenario.	
15 minutes	**Conclusion**	Operation and maintenance of machinery, including pumps and piping system	• Make generalization and abstraction of the lesson • Assess the learning which may come from any of the following: - Formative test - Oral Examination - Assignment • Other activities to check the retention of learning	• Participating, sharing insights and learning gained • Answering/asking questions	Visual Presentation