Part D Instructor's Guide

Course: Steam Turbine Engine Training Course No. of Trainees: Twelve (12) Trainees Class Layout: Class lay-out suitable for the theoretical part only		Competence: Manage the open Knowledge, Understanding ar Design features and operative massociated auxiliaries: Marine s Topics: Course Introduction 1. Design features of marine s	nd Proficiency (KUP): nechanism of the following mac team turbine	•	
		Learning Outcomes: At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes Formative Assessment: Written Test		o Part C Course	
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
30 minutes	Course Introduction	 House Rules and Regulations Regulation III/2 and Section A-III/2 of the STCW Convention, 1978, as amended Introduction to marine steam turbine Intended Learning Outcomes (ILOs) 	 Class orientation/ briefing Lecture-Discussion or other teaching methods suitable for theoretical aspect Presentation of the ILOs 	Listening, note taking, inquiring, answering questions, interactive discussion	 Visual Presentation Video presentation (Introduction to marine steam turbine)

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Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
25 minutes	Core Elements	Design features of marine steam turbine parts of marine steam turbine impulse and reaction steam turbines, including its: construction & design utilization of steam energy advantages and disadvantage	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Video presentation (working principle of impulse and reaction steam turbine) Photo/ illustration of impulse and reaction steam turbine and reaction steam turbine
5 minutes	Conclusion	 Regulation III/2 and Section A-III/2 of the STCW Convention, 1978, as amended Design features of marine steam turbine 	 Make generalizations and abstraction about the lessons 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 and asking 	Visual Presentation

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			Competence: Manage the oper	ation of propulsion plant machi	inery
			Knowledge, Understanding ar		
Course:	Steam Turbine	Engine Training Course	Design features and operative n		chinery and associated
			auxiliaries: Marine steam turbin	e	
			Topics: 2. Operative mechanism of ma	arina staam turbina	
			Learning Outcomes:	arme steam turbine	
No of T	Frainees: Twelve	(12) Trainees	At the end of the lesson, the trai	nees should be able to: Refer t	n Part C Course
110. 01 1	Tunioco: Twork	7 (12) 114111000	Syllabus for the Intended Learni		or art o course
Class La	avout: Class lav-	out suitable for the theoretical	Formative Assessment: Writte		
part only	•				
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Design features of marine steam turbine Intended Learning Outcomes (ILOs) 	 Review of previous lesson Presentation of the ILOs or other activities to motivate the trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
50 minutes	Core Elements	2. Operative mechanism of the components of marine steam turbine: • high pressure turbine • low pressure turbine • astern turbine • astern guardian valve • maneuvering valve	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	Visual presentation Photo/ illustration of marine steam turbine with its major components

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Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Conclusion	Operative mechanism of marine steam turbine	 Make generalizations and abstraction about the lessons Assess the learning which may come from any of the following: Formative Test Oral Examination Assignment Other activities to check the retention of learning 	 Participate, share insights and learning gained Answering and asking 	Visual Presentation

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Course: Steam Turbine Engine Training Course		propulsion plant and aux Knowledge, Understanding ar Theoretical knowledge o Heat cycle, thermal effici 2 marine steam turbine Topics: Topics: Thermodynamics and heat	performance assessment and r iliary machinery nd Proficiency (KUP): n Thermodynamics and heat tra ency and heat balance of the fo	ansmission ollowing:	
	No. of Trainees: Twelve (12) Trainees Class Layout: Class lay-out suitable for the theoretical		Learning Outcomes: At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes Formative Assessment: Written Test		
part only Time	-	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Operative mechanism of marine steam turbine Intended Learning Outcomes (ILOs) 	 Review of previous lesson Presentation of the ILOs or other activities to motivate the trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation

Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional
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					Materials Used
1 hour and 20 minutes	Core Elements	3. Thermodynamics and heat transmission in marine steam turbine propulsion plant • principles of thermodynamics and heat transmission applied in marine steam turbine propulsion plant • properties of steam • steam cycle • relationship of sea water temperature and main condenser vacuum	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Heat transmission diagram Sea water temperature vs main condenser vacuum graph
5 minutes	Conclusion	Thermodynamics and heat transmission in marine steam turbine propulsion plant	 Make generalizations and abstraction about the lessons 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 and asking 	Visual Presentation

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Course: Steam Turbine Engine Training Course		Competence: • Plan and schedule opera • Operation, surveillance, propulsion plant and aux Knowledge, Understanding at Theoretical knowledge on Mech Topics: 4. Mechanics and Hydromech	performance assessment and identification in the control of the co	maintaining safety of	
	rainees: Twelve	(12) Trainees -out suitable for the theoretical	Learning Outcomes: At the end of the lesson, the tra Syllabus for the Intended Learn Formative Assessment: Writte	ing Outcomes	o Part C Course
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Thermodynamics and heat transmission in marine steam turbine propulsion plant Intended Learning Outcomes (ILOs) 	 Review of previous lesson Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
50 minutes	Core Elements	 4. Mechanics and Hydromechanics The principles and applications of mechanics and hydromechanics applied in marine 	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Video presentation (How marine steam turbine works?)

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Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Conclusion	Mechanics and Hydromechanics as applied in marine steam turbine	 Make generalizations and abstraction about the lessons 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 and asking 	Visual presentation

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Course: Steam Turbine Engine Training Course		propulsion plant and aux Knowledge, Understanding at Propulsive characteristics of ste consumption Topics: 5. Propulsive characteristic of and fuel consumption	performance assessment and kiliary machinery nd Proficiency (KUP): eam turbine, including speed, or	utput and fuel	
No. of Trainees: Twelve (12) Trainees Class Layout: Class lay-out suitable for the theoretical		Learning Outcomes: At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes Formative Assessment: Written Test			
part only Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional
5 minute s	Introduction	 Mechanics and hydromechanics Intended Learning Outcomes (ILO) 	Review of the previous lesson Presentation of the ILOs or other activities to motivate trainees	Listening, note taking, answering questions, interactive discussion	Materials Used Visual presentation
1hour and 20 minute s	Core Elements	5. Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the Participating in the discussion, answering questions, interact with co- trainees, writing down notes	 Visual presentation Performance graph curve (diesel vs. turbine)
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional

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					Materials Used
5 minute s	Conclusion	Propulsive characteristic of marine steam turbine, including speed, output and fuel consumption	 Make generalizations and abstraction about the lessons 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, interactive discussion Asking and answering 	Visual presentation

Course: Steam Turbine Engine Training Course	Competence:
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			propulsion plant and auxi Knowledge, Understanding an Theoretical knowledge on Heat of steam turbine	performance assessment and r iliary machinery ad Proficiency (KUP):	
			Topics: 6. Heat cycle, thermal efficience	cy and heat balance of marin	e steam turbine
	No. of Trainees: Twelve (12) Trainees Class Layout: Class lay-out suitable for the theoretical		Learning Outcomes: At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes Formative Assessment: Written Test		
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Propulsive characteristics of marine steam turbine, including speed, output and fuel consumption Intended Learning Outcomes (ILOs) 	 Review of previous lesson Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation

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Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
1 hour and 20 minutes	Core Elements	6. Heat cycle, thermal efficiency and heat balance of marine steam turbine propulsion plant • Rankine cycle	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Heat Balance Diagram Video presentation (Rankine cycle)
5 minutes	Conclusion	Heat cycle, thermal efficiency and heat balance of marine steam turbine	 Make generalizations and abstraction about the lessons 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 Asking and answering 	Visual presentation

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Course: Steam Turbine Engine Training Course No. of Trainees: Twelve (12) trainees Class Layout: Class lay-out suitable for the theoretical part only		propulsion plant and aux Knowledge, Understanding aux Operating limits of propulsion pl Topic:	performance assessment and iliary machinery nd Proficiency (KUP): ant		
		7. Operating limits of marine steam turbine propulsion plant Learning Outcomes: At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes Formative Assessment: Written and Practical Test			
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Heat cycle, thermal efficiency and heat balance of marine steam turbine Intended Learning Outcomes (ILOs) 	 Review of the previous lesson Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
1 hour and 50 minutes	Core Elements	 7. Operating limits of marine steam turbine propulsion plant warm up criteria (key instructions and piping system) 	Interactive Lecture-Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Piping Diagram (warm up of marine steam turbine plant) Engine data sheet

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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	 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 Analyze the result form the checked parameters and take appropriate actions 	 Exercise sheet Familiarization Checklist Simulator Manufacturer's instruction manual for marine steam turbine
5 minutes	Conclusion	Operating limits of marine steam turbine propulsion plant	 Make generalizations and abstraction about the lessons 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 Asking and answering 	Visual Presentation

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Course: Steam Turbine Engine Training Course		Competence: • Plan and schedule open • Operation, surveillance propulsion plant and au Knowledge, Understanding a Functions and mechanism of a Topics: 8. Function and mechanism of propulsion plant. Learning Outcomes:	, performance assessment and exiliary machinery and Proficiency (KUP): and promatic control for main engin	ne	
No. of Tr	rainees: Twelve	(12) trainees	At the end of the lesson, the tra for the Intended Learning Outc		to Part C Course Syllabus
Class La part only	Class Layout: Class lay-out suitable for the theoretical part only		Formative Assessment: Writt	en Test	
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Operating limits of marine steam turbine propulsion plant Intended Learning Outcomes (ILOs) 	 Review of the previous lessons Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
1 hour and 20 minutes	Core Elements	8. Function and mechanism of the following automatic controls for marine steam turbine propulsion plant: • rpm control • program control • direct control • lever control • nozzle lift control	Interactive Lecture- Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Control mechanism (stop) diagram

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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	 Make generalizations and abstraction about the lessons 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 Asking and answering 	Visual presentation

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Course: Steam Turbine Engine Training Course		Plan and schedule operations Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery Knowledge, Understanding and Proficiency (KUP): The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery			
			Topics: 9. Operation of marine steam Learning Outcomes:		
	rainees: Twelve	`	At the end of the lesson, the tr Syllabus for the Intended Lear		r to Part C Course
Class La part only	iyout: Class lay-o	ut suitable for the theoretical	Formative Assessment: Write	ten and Practical Test	
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Function and mechanism of automatic control for marine steam turbine propulsion plant Intended Learning Outcomes (ILOs) 	 Review of the previous lesson Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
3 hours and 20 minutes	Core Elements	 9. Operation of marine steam turbine propulsion plant functions and locations of each component of marine steam turbine propulsion plant 	Interactive Lecture- Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Video presentation (Working principle of marine boiler) Piping diagrams
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials

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					Used
		 safety precautions in operating the marine steam turbine plant procedures for arrival, in port and departure 			
6 hours		Arrival and departure operation of marine steam turbine	Practical exercise	Operate marine steam turbine for arrival and departure using a simulator	 Exercise sheet Simulator Manufacturer's instruction manual for marine steam turbine
5 minutes	Conclusion	Operation of marine steam turbine propulsion plant	 Make generalizations and abstraction about the lessons 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 Asking and answering 	Visual presentation

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Course: Steam Turbine Engine Training Course		Competence: • Plan and schedule ope • Operation, surveillance propulsion plant and au Knowledge, Understanding a Start up and shut down main p systems Topics: 10. Plant up and Plant down	, performance assessment and ixiliary machinery and Proficiency (KUP): ropulsion and auxiliary machin	ery, including associated	
No. of Trainees: Twelve (12) trainees Class Layout: Class lay-out suitable for the theoretical		Learning Outcomes: At the end of the lesson, the trainees should be able to: Refer to Part C Course Syllabus for the Intended Learning Outcomes Formative Assessment: Written and Practical Test			
part only Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Operation of marine steam turbine Intended Learning Outcomes (ILOs) 	 Review of the previous lesson Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
	Core	10. Plant up and Plant down of marine steam	Interactive Lecture- Discussion or other method teaching methods suitable for	Participating in the discussion, answering questions, interact with co-	Visual presentation

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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	 Exercise Sheet Simulator Manufacturer's instruction manual for marine steam turbine
5 minutes	Conclusion	Plant up and Plant down of main propulsion and auxiliary machinery	 Make generalizations and abstraction about the lessons 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 Asking and answering 	Visual presentation

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ourse Title: Steam Turbine Engine Training Course			propulsion plant and at Knowledge, Understanding The efficient operation, surveil safety of propulsion plant and Topics: 11.Surveillance, performance	e, performance assessment an uxiliary machinery and Proficiency (KUP): llance, performance assessme auxiliary machinery se assessment and maintaini	ent and maintaining
	Steam turbine propulsion plant Learning Outcomes: No. of Trainees: Twelve (12) trainees At the end of the lesson, the trainees should be able to: Refer to Pa Syllabus for the Intended Learning Outcomes Class Layout: Class lay-out suitable for the theoretical part Formative Assessment: Written and Practical Test		er to Part C Course		
only Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional Materials Used
5 minutes	Introduction	 Plant up and plant down of main propulsion and auxiliary machinery Intended Learning Outcomes (ILOs) 	 Review of previous lessons Presentation of the ILOs or other activities to motivate trainees 	Listening, note taking, answering questions, interactive discussion	Visual presentation
50 minutes	Core Elements	11. Surveillance and performance assessment and maintaining safety of marine steam turbine propulsion plant	Interactive Lecture- Discussion or other method teaching methods suitable for theoretical aspect	Participating in the discussion, answering questions, interact with cotrainees, writing down notes	 Visual presentation Performance Curve Graph
Time	Phase	Content	Instructor-led Activity	Student Learning Activity	Instructional

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					Materials Used
2 hours		Maintaining safe operation of marine steam turbine propulsion plant	Practical Exercise	 Conduct surveillance and performance assessment using gathered data Analyze the result of surveillance and performance assessment conducted and take appropriate action in accordance with technical specifications 	Exercise Sheet Simulator Manufacturer's instruction manual for marine steam turbine
5 minutes	Conclusion	Surveillance, performance assessment and maintaining safety of marine steam turbine propulsion plant	 Make generalizations and abstraction about the lessons 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 Asking and answering 	Visual presentation

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