

Competence	Knowledge Understanding and Proficiency	Chem	Thermo	Mech	ICT	AuxMach 1-Lec	Aux Mach 2-Lec	Aux Mach 3-Lec	AuxMach 1-Lab	AuxMach 2-Lab	AuxMach 3-Lab	E Mat	Electro 1	Electro 2	Electro 3	MDraw	Auto 1	Auto 2	Mach 1	Mach 2	Mach 3	Main Prop 1	Main Prop 2	ENW 1	ENW 2	Maint	Ship Con	Mar Law	Mgmt	AFF	PSCRB	MIFA	ST
Maintain a safe Engineering watch	1.1.1	Thorough knowledge of principles to be observed in keeping an marine engineering watch, including: 1 duties associated with taking over and accepting a watch 2 routine duties undertaken during a watch 3 maintenance of the machinery space logs and the significance of the readings taken 4 duties associated with handing over a watch																															
	1.1.2	Safety and emergency procedures; change-over of remote/ automatic to local control																															
	1.1.3	Safety precautions to be observed during a watch and immediate action to be taken in the event of fire or accident, with particular reference to oil systems																															
	1.1.4	Knowledge of engine-room resource management principles, including:																															
		1 Allocation, assignment and prioritization of resources																															
		2 Effective communication																															
		3 Assertiveness and leadership																															
		4 Obtaining and maintaining situational awareness																															
	5 Consideration of team experience																																
	Use English in written and oral form	1.2.1	Adequate knowledge of the English language to enable the officer to use engineering publications and to perform engineering duties																														
Use internal communication systems	1.3.1	Operation of all internal communication systems on board																															
Operate main and auxiliary machinery and associated control systems	1.4.1	Basic construction and operation principles of machinery systems, including:																															
		1 Main diesel engine																															
		2 Marine Steam Turbine																															
		3 Marine Gas Turbine																															
		4 Marine Boiler																															
		5 Shafting installations and propeller																															
		6 Other auxiliaries (including various pumps, air compressor, purifier, twg, heat exchanger, refrigeration, air conditioning & ventilation system)																															
		7 Steering gear																															
		8 Automatic Control Systems																															
		9 Fluid flow characteristics of lubricating oil, fuel oil and cooling systems																															
1.4.2	Safety and emergency procedures for operation of propulsion plant machinery including control systems																																
	Preparation, operation, fault Detection and necessary measures to prevent damage for the following machinery items and control systems																																
1.4.3	1 Main engine and associated Auxiliaries																																
	2 Steam boilers and associated auxiliaries and steam systems																																
	3 Auxiliary prime movers and associated systems																																
	4 Other auxiliaries, including refrigeration, air conditioning and ventilations systems																																
Operate fuel, lubrication, ballast and other pumping systems and associated control systems	1.5.1	Operational Characteristics of pumps and piping systems, including control systems																															
	1.5.2	Operation of pumping systems																															
		1 Routine pumping operations																															
2 Operation of bilge, ballast and cargo pumping systems																																	
1.5.3	Oil-water separators (or similar equipment) requirements and operation																																



Notes: These are knowledge and understanding items from the competence Table A-III/1 "Plan and conduct operations" which are considered as underpinning knowledge.	1.2.1	Thermodynamics and heat transmission	✓																																				
	1.2.2	Mechanics and Hydromechanics		✓																																			
	1.2.4	Heat cycle, thermal efficiency and heat balance of the following:																																					
	1.2.4.1	Marine diesel engine	✓																																				
	1.2.4.2	Marine Steam Turbine	✓																																				
	1.2.4.3	Marine Gas Turbine	✓																																				
	1.2.4.4	Marine Steam boiler	✓																																				
	1.2.5	Refrigerators and refrigeration cycle	✓																																				
	1.2.8	Physical and chemical properties of fuels and lubricants	✓																																				
1.2.7	Technology of Materials											✓																											

TABLE A-III/1 FUNCTION: ELECTRICAL ELECTRONIC AND CONTROL ENGINEERING AT THE OPERATIONAL LEVEL

Operate electrical, electronic and control systems	2.1.1	Basic Configuration and operation principles of the following electrical, electronic and control equipment																																						
	1	Electrical Equipment						✓		✓																														
	1 a	generator and distribution systems																																						
	1 b	preparing, starting, paralleling and changing over generator																																						
	1 c	electrical motors including methodologies																																						
	1 d	high voltage installations																																						
	1 e	sequential control circuits and associated system devices																																						
	2	Electronic equipment							✓																															
	2.a	characteristics of basic electronic circuit elements							✓																															
	2.b	flowchart for automatic and control systems																																						
	2.c	functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam																																						
	3	Control systems																																						
	3 a	various automatic control methodologies and characteristics																																						
	3.b	Proportional-Integral-Derivative (PID) control																																						

Maintenance and repair of electrical and electronic equipment	2.2.1	Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment						✓	✓	✓		✓	✓																										
	2.2.2	Maintenance and repair of electrical system equipment, switchboards, electric motors, generators and DC electrical systems and equipment																																					
	2.2.3	Detection of electric malfunction, location of faults and measures to prevent damage						✓	✓	✓																													
	2.2.4	Construction and operation of electrical testing and measuring equipment						✓				✓																											
	2.2.5	Function and performance tests of the following equipment and their configuration:																																					
	1	Monitoring System																																					
	2	Automatic control devices																																					
3	Protective devices							✓																															
2.2.6	The Interpretation of electrical and simple electronic diagrams						✓	✓	✓																														

TABLE A-III/1 FUNCTION: MAINTENANCE AND REPAIR AT THE OPERATIONAL LEVEL

Maintenance and repair of electrical and electronic equipment	3.1.1	Characteristics and limitations of materials used in construction and repair of ships and equipment						✓																														
	3.1.2	Characteristics and limitations of processes used for fabrication and repair						✓																														



Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	3.1.3	Properties and parameters considered in the fabrication and repair of systems and components																			✓							✓	✓	✓
	3.1.4	Methods for carrying out safe emergency/temporary repairs																										✓	✓	✓
	3.1.5	Safety measures to be taken to ensure safe working environment and for using hand tools, machine tools and measuring instruments																										✓	✓	✓
	3.1.6	Use of hand tools, machine tools and measuring instruments																										✓	✓	✓
	3.1.7	Use of various types of sealants and packings																										✓	✓	
Maintenance and repair of shipboard machinery and equipment	3.2.1	Safety measures to be taken for repair and maintenance including the safe isolation of shipboard machinery and equipment required before personnel are permitted to work on such machinery or equipment			✓	✓	✓															✓								✓
	3.2.2	Appropriate basic mechanical knowledge and skills			✓	✓	✓																							✓
	3.2.3	Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment			✓	✓	✓															✓								✓
	3.2.4	The use of appropriate specialized tools and measuring instruments			✓	✓	✓															✓								✓
	3.2.5	Design characteristics and selection of materials in construction of equipment		✓							✓																			
	3.2.6	Interpretation of machinery drawings and handbooks																	✓											✓
	3.2.7	The interpretation of piping, hydraulic and pneumatic diagrams																		✓		✓								
Note: These are knowledge and understanding listed from the competence Table A-10/3 "Detect and identify the cause of machinery malfunctions and correct faults" which are considered as engineering knowledge.																														
3.2.1	Non-destructive examination									✓																				
TABLE A-III/3 FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ONBOARD AT THE OPERATIONAL LEVEL																														
Ensure compliance with pollution prevention requirements		Prevention of the pollution of the marine environment																												
	4.1.1	Knowledge of the precautions to be taken to prevent pollution of the marine environment																											✓	
	4.1.2	Anti-pollution procedures and all associated equipment																											✓	✓
4.1.3	Importance of proactive measures to protect the marine environment																												✓	
Maintain seaworthiness of the ship		Ship stability																												
	4.2.1	Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment																											✓	
	4.2.2	Understanding of the fundamentals of watertight integrity																											✓	
	4.2.3	Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy																											✓	
4.2.4	General knowledge of the principal structural members of a ship and the proper names for the various parts																												✓	
Prevent, control and fight fires on board (model course 2.03)	(AFF)																													
Operate life-saving appliances (model course 1.23)	(PSCRB)																													
Apply medical first aid on board ship (model course 1.14)	(MEFA)																													
Monitor compliance with legislative requirements	4.8.1	Basic working knowledge of the relevant IMO conventions concerning safety of life at sea, security and protection of the marine environment																											✓	✓



