

Proposal to modernise the Methodology of Teaching, Assessment/ Examination

ETO - STCW III/6 CoC			
Competency/ Module: Marine Engineering: Electrical Motors and Generators			
Knowledge, understanding and proficiency	Recommendation of working group regarding the outcome and objective.	Rationale	Action required
Outcome1: Explain and solve problems on three-phase circuits	Keep	Relevant	None
1.1 Balanced star and delta connected loads	Keep	Relevant	None
1.2 Power factor	Keep	Relevant	None
1.3 Phasor diagrams	Keep	Relevant	None
1.4 Unbalanced loads	Keep	Relevant	None
1.5 Marine three phase systems	Keep	Relevant	None
Outcome 2: Explain the principles of and solve problems on magnetism and electromagnetic induction	Keep	Relevant	None
2.1 Non- magnetic and ferromagnetic materials	Keep	Relevant	None
2.2 Non-composite magnetic circuits	Keep	Relevant	None
2.3 Composite magnetic circuits	Keep	Relevant	None
2.4 Current carrying conductor	Keep	Relevant	None
2.5 Electro- motive- force in a coil	Keep	Relevant	None

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2.6 Self and mutual inductance	Keep	Relevant	None
2.7 Electro motive force in a conductor	Keep	Relevant	None
Outcome 3: Explain the action of generators	Keep	Relevant	None

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<p>3.1 Constructions and connections of a.c. synchronous generators</p> <ul style="list-style-type: none"> - Excitation methods - Full load current and rotor speed - Voltage and frequency in a.c. synchronous generators. - Synchronising using lamps, synchroscope and load sharing - Synchronising and load sharing - Automatic voltage regulators for a.c. generators - Failure of automatic voltage regulators - Causes of failures - Motoring and its effects - Preference trips - Operation and testing of a preference trip - Insulated and earthed neutral systems - Operation of reverse power relays - Earth fault detection - Methods of protection for a.c. synchronous generators 	Modernise	Testing preference trips is an annual Lloyd's requirement and is routinely demonstrated by ships staff.	Expanded this outcome to include "Operation and testing of a preference trips".
3.2 Excitation methods	Keep	Relevant	None
3.3 Full load current and rotor speed	Keep	Relevant	None

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3.4 Voltage and frequency in a.c. synchronous generators	Keep	Relevant	None
3.5 Synchronising using lamps, synchroscope and load sharing	Keep	Relevant	None
3.6 Synchronising and load sharing	Keep	Relevant	None
3.7 Automatic voltage regulators for a.c. generators	Keep	Relevant	None
3.8 Failure of automatic voltage regulators	Keep	Relevant	None
3.9 Causes of failures	Keep	Relevant	None
3.10 Motoring and its effects	Keep	Relevant	None
3.11 Preference trips	Keep	Relevant	None
3.12 Operation of a preference trip	Keep	Relevant	None
3.13 Insulated and earthed neutral systems	Keep	Relevant	None
3.14 Operation of reverse power relays	Keep	Relevant	None
3.15 Earth fault detection	Keep	Relevant	None
3.16 Methods of protection for a.c. synchronous generators	Keep	Relevant	None
Outcome 4: Explain and solve problems on the action of motors	Keep	Relevant	None
4.1 Principles and characteristics of induction motors	Keep	Relevant	None
4.2 Production of torque	Keep	Relevant	None
4.3 Slip	Keep	Relevant	None

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4.4 Slip formula	Keep	Relevant	None
4.5 Torque/speed characteristic	Keep	Relevant	None
4.6 Rotor resistance	Keep	Relevant	None
4.7 Power flow chart	Keep	Relevant	None
4.8 Shaft output power and efficiency	Keep	Relevant	None
4.9 Operation of synchronous motors	Keep	Relevant	None
4.10 Construction of stators and rotors for induction and synchronous motors	Keep	Relevant	None
4.11 Speed control	Modernise	We must ensure different types of speed controls and motors are covered in the syllabus.	Include Variable Frequency Drives (VFD) and 2 speed motors in this outcome
4.12 Phasor diagrams	Keep	Relevant	None
4.13 Synchronous and induction motors for marine propulsion	Modernise	We must ensure modern speed control methods are covered in the syllabus.	Include the implementation of speed control for PEMs.
Proposal submitted by:	Any other outcomes for this competency, above and beyond STCW which would be needed due to use of modern technology and impact of future fuels onboard:		
	Objective	Reason Why	Action required
Cadet Training & Modernisation Working Group	Include Human Element Factors throughout the syllabus	To provide seafarers with a contextualised understanding of the Human Element in the maritime industry, showing how they can put theory into practice in the work they carry out at sea.	Raise awareness throughout the Cadet's training of the areas in which human element factors will have an impact. Recommendations on where this can be included have been noted throughout the entire syllabus. Not every template has

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			Human Element Factor recommendations but please do add any you feel may have been missed.
Cadet Training & Modernisation Working Group	Include Data Science skills throughout the syllabus	Data Science Skills (Comprehension, Analysis, Presentation, etc...) are already required within much of the syllabus. A further, specific focus on these skills needs to be taught where relevant.	A specific topic will need to be introduced to improve Cadets' Data Science skills. Practical application of data science skills should be highlighted throughout the syllabus. Not every template has Data Science recommendations but please do add any you feel may have been missed.
Cadet Training & Modernisation Working Group	Ensure all outcomes are contextualised to help Cadets understand what they are learning in relation to what they will experience at sea.	While some outcomes are intrinsically linked to work carried out at sea, some need to be contextualised to show how they apply to work on board. Where this is the case, it is important to make sure Cadets clearly understand how the outcome relates to work at sea and it is essential to make sure that this context is given with reference to current and future seagoing technologies and practices.	Where outcomes do not specifically cover a topic which relates to work carried out at sea, more must be done to contextualise the outcome and make it relevant to the maritime industry, giving specific shipping examples of how the outcome may be applied in a modern shipping context. Not every template has contextualisation recommendations but please do add any you feel may have been missed.