**MSQ Unit 31**

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| Title: | **Electrical principles for marine engineers** |
| QCF Level: | **3** |
| Credit value: | **6** |
| Learning outcomes*The learner will:* | Assessment criteria *The learner can:* |
| 1. Understand basic electrical concepts
 | * 1. Describe the electron theory of current flow in terms of electrical conductors
	2. Describe circuit parameters in a dc resistive network.
	3. State Kirchhoff’s Current and Voltage laws as applied to direct current resistive networks
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| 1. Be able to solve problems in Direct Current (DC) resistive networks
 | * 1. Calculate circuit parameters in a parallel resistive dc network
	2. Calculate circuit parameters in a series resistive dc network
	3. Calculate circuit parameters in a combined series-parallel resistive dc network
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| 1. Understand magnetic concepts
 | * 1. Apply Faraday’s and Lenz’s Laws to electromagnetic induction problems
	2. Describe the concepts of self and mutual inductance
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| 1. Be able to determine magnetic quantities.
 | * 1. Calculate the magnitude and direction of force on a current carrying conductor situated perpendicularly in a uniform magnetic field
	2. Calculate the instantaneous generated electro-motive force (e.m.f) when a coil of conductor is rotated in a steady magnetic field.
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| 1. Understand the fundamental properties of a sinusoidal waveform
 | * 1. Describe the generation of an alternating e.m.f. created by a single rotating coil in a uniform magnetic field
	2. Plot a sinusoidal voltage waveform.
	3. Determine the quantities of a sinusoidal waveform
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| 1. Be able to determine fundamental properties of a sinusoidal waveform
 | * 1. Carry out measurements to verify the root mean squared (r.m.s.) value and frequency of a displayed sinusoidal waveform
	2. Represent sinusoidal quantities by phasor diagram
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| 1. Understand phasor diagrams
 | * 1. Describe inductive reactance and capacitive reactance
	2. Draw phasor diagrams for ac circuits containing resistance only, inductance only and capacitance only when connected to a sinusoidal voltage
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| 1. Be able to determine alternating current quantities
 | * 1. Solve problems involving inductive and capacitive reactance
	2. Calculate the current in circuits containing resistance only, inductance only and capacitance only, when connected to a sinusoidal voltage
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| **Additional information about the unit** |  |
| Unit aim(s) | to develop the knowledge and understanding of basic electrical concepts, magnetic and electromagnetic theory in a marine engineering context |
| Unit expiry date |  |
| Details of the relationship between the unit and relevant national occupational standards (if appropriate) | MNTB NOS (Jan 2006) – C01 Monitor and Operate Engine Room MachineryC11 Prepare and operate vessel propulsion machinery and ancillary systemsC13 Operate and adjust vessel electrical equipmentC33 Carry out maintenance of vessel electrical machinery and systems |
| Details of the relationship between the unit and other standards or curricula (if appropriate) | Maritime and Coastguard Agency Marine Guidance Notice regarding Certificates of Competency – Engine Department,  |
| Assessment requirements specified by a sector or regulatory body (if appropriate) | MSA Assessment StrategyMCA requirements |
| Endorsement of the unit by a sector or other appropriate body (if required) | MCA…. |
| Location of the unit within the subject/sector classification system | Transportation |
| Name of the organisation submitting the unit | Scottish Qualifications Authority |
| Availability for use |  |
| Availability for delivery |  |
| Guided Learning Hours | 40 |