

**Unit Title:** Electrical Principles  
**Level:** Two  
**Credit Value:** 3  
**GLH:**  
**NOCN Unit Code:** XJ0/2/TE/001  
**QCA Unit Reference**  
**Grading Descriptors:** Not Applicable

This unit has 5 learning outcomes.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
<b>The learner will:</b>	<b>The learner can:</b>
1. DUE TO THE INABILITY TO TRANSCRIBE SOME FORMULAR IN THIS UNIT MEMBERS WHO WISH TO USE THIS UNIT MAY CONTACT THE TROCEN MIDDLESBROUGH OFFICE FOR A PAPER COPY OF THE UNIT. Apply circuit theory to the solution of simple circuit problems	1.1. Apply Ohm's law to the solution of problems relating to series-parallel combinations of resistors 1.2. Apply Kirchhoff's Laws to problems involving not more than two unknowns
2. Apply the fundamental laws and properties of electric fields to problems involving capacitors	2.1. Describe the concepts of electric field and electric flux 2.2. Describe the relationship between electric field strength and electric flux density and define the relative permittivity of free space 2.3. Define capacitance as the constant of proportionality between charge and potential difference and analyse the relationship between capacitance and the physical dimensions of parallel plates 2.4. Investigate expressions for energy stored by a capacitor 2.5. Solve problems relating to uniform fields in single dielectrics involving the relationships previously established 2.6. Describe expressions for the equivalent capacitance of capacitors connected in series and parallel, solve simple problems

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LEARNING OUTCOMES	ASSESSMENT CRITERIA
<b>The learner will:</b>	<b>The learner can:</b>
3. Apply the fundamental laws governing magnetic fields to the solution of problems relating to magnetic circuits and materials	3.1. Evaluate the concept of the magnetic field and magnetic flux to explain the forces of attraction and repulsion between magnetised bodies and define magnetic field strength 3.2. Investigate the relationship between magnetic field strength and magnetic flux density and define relative permeability and the permeability of free space 3.3. Summarises magnetomotive force, reluctance and magnetic field strength and solves problems involving magnetic circuits 3.4. Describe hysteresis loss by means of a loop diagram
4. "Apply the fundamental principles of, and laws governing electromagnetic induction"	4.1. Evaluate the motor principle in terms of $F = B.L.I.$ 4.2. Establish the relationships $E = B.L.V.$ and $E=N.d \phi/dt$ and use them to solve simple problems 4.3. Explain the historical and technical significance of Faraday's and Lenz's Laws 4.4. Explain the concept of eddy currents and eddy current loss

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LEARNING OUTCOMES	ASSESSMENT CRITERIA
<b>The learner will:</b>	<b>The learner can:</b>
5. Understand the concepts of self and mutual inductance and relates these to the transformer principle	5.1. Define self inductance of a coil 5.2. Deduce and apply the relationships: $E=L \frac{di}{dt}$ and $\phi = NI$ 5.3. Define mutual inductance and describe the production of induced voltage due to change of mutual flux linkage 5.4. Describe the transformer principle 5.5. Deduce that energy stored in an inductor is $\frac{1}{2}LI^2$ 5.6. Solve problems on self inductance, mutual inductance and the transformer principle

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### ASSESSMENT INFORMATION

#### Guidance:

This grid gives details of the assessment activities to be used with the unit attached. Please refer to the NOCN Handbook for definitions of each activity and the expectations for assessment practice and evidence for moderation.

**The assessment activities for this unit are indicated in the table below:**

**Key: P = Prescribed** – this assessment method *must* be used to assess the unit.

**O = Optional** – this assessment method *could* be used to assess the unit.

<b>Case study</b>		<b>Project</b>	
<b>Written question &amp; answer/test/exam</b>		<b>Role play/simulation</b>	
<b>Essay</b>		<b>Practical demonstration</b>	
<b>Report</b>		<b>Group discussion</b>	
<b>Oral question and answer</b>		<b>Performance/exhibition</b>	
<b>Written description</b>		<b>Production of artefact</b>	
<b>Reflective log / diary</b>		<b>Practice file</b>	

#### Signposting Key Skills

This unit offers clear opportunities for learners to provide evidence of achievement in Key Skills achievement in the following skill area/s:

<b>Key Skill</b>		<b>Wider Key Skill</b>	
Communication		Working with others	
Information Technology		Problem solving	
Application of Number		Improving Own Learning and Performance	

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**Accredited Start date:**  
**Accredited End date:**  
**Unit Sector/Subject area:**  
**Grading descriptors:**  
**Availability for Use:**

<b>Purpose and Aim of the Unit</b>	Free Text
<b>Restrictions on the Availability</b>	Free Text or N/A
<b>Additional Assessment Requirements</b>	Free Text or N/A
<b>Details of relationship between the Unit and the NOS</b>	Free Text or N/A
<b>Details of relationship between the Unit and Standards (not NOS)</b>	Free Text or N/A
<b>Endorsement of the Unit by</b>	Free Text or N/A