### Electrotechnology Curriculum Framework - HSC Content overview - DIRECT CURRENT CIRCUITS (Part 1)

#### Direct current circuits (Part 1)

- **safe work practices and procedures**
  - working with electricity:
    - measuring electrical values on a live circuit
    - isolating a device
    - selecting and using test instruments
    - testing or measuring 'live'
    - dealing with unexpected situations or unplanned events
  - risk management

- **nature of electricity and electron theory**
  - static
  - types:
    - conventional current
    - electron flow
    - a.c. and d.c.
  - production by:
    - renewable energy sources
    - non-renewable energy sources
  - utilisation (loads)
  - transportation via transmission and distribution systems
  - meaning of:
    - 'live'
    - 'dead'
    - 'on-line'
    - 'off-line'
    - energised
    - isolated
    - closed circuit
    - open circuit

- **International Systems of Units (SI)**
  - electric current
  - electric potential
  - force
  - power
  - resistance
  - speed
  - velocity
  - work
  - energy
  - conversion of units to multiple and sub-multiple
  - calculations using engineering prefixes
  - scientific notation
  - transposition of formulae
  - measurements and calculations for range of projects

- **electrical concepts (basic)**
  - basic principles by which current produces:
    - heat
    - light
    - magnetic fields
    - chemical reactions
  - typical uses of the effects of current:
    - fundamental principles (listed in AS/NZS 3000) for protection against
      - physiological effects of current
      - damaging effects of current
    - conservation of energy principle
    - production of electromotive force (EMF) from:
      - conductor in magnetic field
      - heating of a thermocouple
      - sunlight on photovoltaic cells
      - piezo electric effect
    - production of electrical current from chemical reactions
      - primary cells
      - secondary cells
      - battery
    - electrochemical cells
      - fuel cells
    - electrical wiring, machines and systems:
      - efficiency
      - affect of losses
      - relationship between force, power, work and energy
      - calculation of power dissipated in a circuit from voltage, current and resistance values
      - effects of power rating of devices and resistors
      - measurement of electrical power in dc circuits

- **electrical current**
  - Ohm’s Law
    - principle (V=IR)
    - voltage, current and resistance
    - relationship between:
      - graphical relationships
      - voltage and current levels
      - effects of open circuit, closed circuit and short circuit
    - conductor
    - energy source/power supply
    - load
    - protection device
    - switch
    - symbols used to represent each component in a circuit diagram

- **energy and power**
  - basic principles by which current produces:
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    - light
    - magnetic fields
    - chemical reactions
  - typical uses of the effects of current:
    - fundamental principles (listed in AS/NZS 3000) for protection against
      - physiological effects of current
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- **circuit or schematic diagram and major components for single-source d.c.**
  - series circuit
  - parallel circuit
  - series/parallel circuit
  - current path(s)
  - load connection
  - power dissipation
  - series circuit
  - parallel circuit
  - series/parallel circuit
  - effect of open and short circuit in:
    - voltage drops
    - voltage divider network
    - resistance
  - branch currents
  - two branch current divider network
  - total branch
  - total resistance
  - total voltage
  - measurement and calculation of values
    - relationship of current entering and leaving a junction
    - output current
    - output voltage levels
    - entering and leaving a junction
    - relationship between voltage and current from measured values
    - relationship between voltage and current from theoretical values
    - basic d.c. single path circuit

- **fundamental principles (listed in AS/NZS 3000) for protection against**
  - physiological effects of current
  - damaging effects of current