

**UEENEEE103A Solve problems in ELV single path circuits**

Element/Performance criteria	MHE text	Heading reference	Test bank	Quiz	Case	Worksheets	Interactives	YouTube playlist	Prac manual
<b>1. Prepare to work on extra-low voltage single path electrical circuits</b>									
1.1 OHS procedures for a given work area are identified, obtained and understood	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety				6, 7		3	
1.2 OHS risk control work preparation measures and procedures are followed	Pethebridge Electrical Wiring Practice 8e	2.3 Workplace hazards and risk control measures						3	
1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken	Pethebridge Electrical Wiring Practice 8e	2.3 Workplace hazards and risk control measures 6.4 Undertaking electrical work							
1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others	Pethebridge Electrical Wiring Practice 8e	2.3 Workplace hazards and risk control measures							
1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety	1	9, 10		1, 4, 5, 7	2	4, 5, 6	
1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety			5				
<b>2. Solve problem in extra-low voltage single path electrical circuits</b>									
2.1 OHS risk control work measures and procedures are followed	Pethebridge Electrical Wiring practice 8e	2 - Work and electrical safety 2.3 Workplace hazards and risk control measures	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16		1, 2, 3, 4, 5,				2
2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety 2.3.1 Lifesaving rules 9 - Testing techniques and compliance verification						3	
2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures	Pethebridge Electrical Wiring Practice 8e	2.3.2 Isolating supply	5, 6						
2.4 Established routines are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety	2, 4, 7, 8, 15, 16	11, 12, 13, 14, 15, 16	1, 2, 4	8, 9, 10, 11, 12, 13, 14, 15, 16		1, 2, 4, 5, 6	1, 2
2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety 3.1 Sustainable work practices 3.6 Fundamental requirements (Wiring Rules Part 1)	1, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	1, 2, 3, 4, 5	1, 2, 3, 4, 5	2		1, 2
<b>3. Complete work and document problem solving activities</b>									
3.1 OHS work completion risk control measures and procedures are followed	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety		5, 6, 7, 8, 9, 10					
3.2 Work site is cleaned and made safe in accordance with established procedures	Pethebridge Electrical Wiring Practice 8e	2 - Work and electrical safety							
3.3 Justification for solutions used to solve circuit problems is documented	Pethebridge Electrical Wiring Practice 8e	6 - Drawings, diagrams, schedules and documents used in electrical work							
3.4 Work completion is documented and appropriate person(s) notified in accordance with established routine procedures	Pethebridge Electrical Wiring Practice 8e	6 - Drawings, diagrams, schedules and documents used in electrical work							
<b>Required Skills and Knowledge</b>									
Evidence shall show an understanding of single path d.c. circuits to an extent indicated by the following aspects:									
T1 Basic electrical concepts encompassing:									
• electrotechnology industry	Jenneson Electrical Principles 7e	1.1 The electrotechnology industry							
• static and current electricity	Jenneson Electrical Principles 7e	1.2 Static and current electricity		1, 2					

• production of electricity by renewable and non renewable energy sources	Jenneson Electrical Principles 7e	1.3 Production of electricity by renewable and non-renewable energy sources	1						
• transportation of electricity from the source to the load via the transmission and distribution systems	Jenneson Electrical Principles 7e	1.4 Transportation of electricity from the source to the load							
• utilisation of electricity by the various loads	Jenneson Electrical Principles 7e	1.5 Utilisation of electricity by the various loads							
• basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity	Jenneson Electrical Principles 7e	1.6 Calculations for quantity of electricity, and velocity and speed in its generation and transportation	2, 4, 7, 8, 15, 16	2		2			
T2 Basic electrical circuit encompassing:									
• symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram	Jenneson Electrical Principles 7e	1.8 Symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram	3, 4	3		1			
• purpose of each component in the circuit	Jenneson Electrical Principles 7e	1.5 Utilisation of electricity by the various loads	3						
• effects of an open-circuit, a closed-circuit and a short-circuit	Jenneson Electrical Principles 7e	1.9 Effects of an open circuit, a closed circuit and a short circuit		4, 5, 6					
• multiple and sub-multiple units	Jenneson Electrical Principles 7e	1.10 Multiple and sub-multiple units	4			3			
T3 Ohm's Law encompassing:									
• basic d.c. single path circuit.	Jenneson Electrical Principles 7e	1.11 Basic d.c. single-path circuit		11	2, 3				
• voltage and currents levels in a basic d.c. single path circuit	Jenneson Electrical Principles 7e	1.13 Voltage, current and resistance in a circuit			2, 3			1	
• effects of an open-circuit, a closed-circuit and a short-circuit on a basic d.c. single path relationship between voltage and current from measured values in a simple circuit	Jenneson Electrical Principles 7e	1.9 Effects of an open circuit, a closed circuit and a short circuit	12		3			1	
• determining voltage, current and resistance in a circuit given any two of these quantities	Jenneson Electrical Principles 7e	1.13.1 Determining voltage, current and resistance in a circuit	11	11	2, 3	10		1	
• graphical relationships of voltage, current and resistance	Jenneson Electrical Principles 7e	1.13.1 Determining voltage, current and resistance in a circuit	11					1	
• relationship between voltage, current and resistance	Jenneson Electrical Principles 7e	1.13 Voltage, current and resistance in a circuit	11	12	2, 3			1	
T4 Electrical power encompassing:									
• relationship between force, power, work and energy	Jenneson Electrical Principles 7e	1.14 Relationship between force, power, energy and work		13	4			4	
• power dissipated in circuit from voltage, current and resistance values	Jenneson Electrical Principles 7e	1.15 Power dissipated in a circuit from voltage, current and resistance values		14	1, 4			4	
• power ratings of devices	Jenneson Electrical Principles 7e	1.16 Power ratings of devices	14		1, 4			4	
• measurement electrical power in a d.c. circuit	Jenneson Electrical Principles 7e	1.17 Measure of electrical power in a d.c. circuit			4	11			
• effects of power rating of various resistors	Jenneson Electrical Principles 7e	1.30 Power ratings of a resistor	13		4	15		4	
T5 Effects of electrical current encompassing:									

• physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect	Jenneson Electrical Principles 7e	1.18 Physiological effects of electrical current and the fundamental principles for protection	5					3	
• basic principles by which electric current can result in the production of heat; the production of magnetic fields; a chemical reaction	Jenneson Electrical Principles 7e	1.19 Basic principles by which electric current can result in the production of heat, the production of magnetic fields or a chemical reaction		5		5			
• typical uses of the effects of current	Jenneson Electrical Principles 7e	1.20 Typical uses of the effects of current		6		4, 5			
• mechanisms by which metals corrode	Jenneson Electrical Principles 7e	1.21 Mechanisms by which metals corrode	6						
• fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current	Jenneson Electrical Principles 7e	1.22 Principles for protection against the damaging effects of current				6			
T6 EMF sources energy sources and conversion electrical energy encompassing:									
• basic principles of producing an emf from the interaction of a moving conductor in a magnetic field	Jenneson Electrical Principles 7e	1.23 Basic principles of producing an electromotive force (EMF)							
• basic principles of producing an emf from the heating of one junction of a thermocouple	Jenneson Electrical Principles 7e	1.23 Basic principles of producing an electromotive force (EMF)							
• basic principles of producing an emf by the application of sun light falling on the surface of photovoltaic cells	Jenneson Electrical Principles 7e	1.23.12 Photoelectric sources		7					
• basic principles of generating an emf when a mechanical force is applied to a crystal (piezo electric effect)	Jenneson Electrical Principles 7e	1.23.15 Piezoelectric sources							
• principles of producing a electrical current from primary, secondary and fuel cells	Jenneson Electrical Principles 7e	1.24 Principles of producing an electrical current		8					
• input, output, efficiency or losses of electrical systems and machines	Jenneson Electrical Principles 7e	1.25 Input, output, efficiency or losses of electrical systems and machines	7			8			
• effect of losses in electrical wiring and machines	Jenneson Electrical Principles 7e	1.26 Effect of losses in electrical wiring and machines							
• principle of conservation of energy	Jenneson Electrical Principles 7e	1.27 Principle of conservation of energy	8						
T7 Resistors encompassing:									
• features of fixed and variable resistor types and typical applications	Jenneson Electrical Principles 7e	1.28 Resistors 1.29 Variable resistors	9	9				5	
• identification of fixed and variable resistors	Jenneson Electrical Principles 7e	1.28 Resistors 1.29 Variable resistors	9			7		5	
• various types of fixed resistors used in the Electro technology Industry e.g. wire-wound, carbon film, tapped resistors	Jenneson Electrical Principles 7e	1.28.2 Resistor types				7		5	
• various types of variable resistors used in the Electro technology Industry e.g. adjustable resistors: potentiometer and rheostat; light dependent resistor (LDR); voltage dependent resistor (VDR) and temperature dependent resistor (NTC, PTC)	Jenneson Electrical Principles 7e	1.29 Variable resistors	9	10				5	
• characteristics of temperature, voltage and light dependent resistors and typical applications of each	Jenneson Electrical Principles 7e	1.29 Variable resistors	9					5	
• power ratings of a resistor	Jenneson Electrical Principles 7e	1.30 Power ratings of a resistor				15		5	
• power loss (heat) occurring in a conductor	Jenneson Electrical Principles 7e	1.31 Power loss (heat) occurring in a conductor				9			
• resistance of a colour coded resistor from colour code tables and confirm the value by measurement	Jenneson Electrical Principles 7e	1.32 Reading resistors	10					6	

• measurement of resistance of a range of variable' resistors under varying conditions of light, voltage, temperature conditions	Jenneson Electrical Principles 7e	1.29 Variable resistors	9		5				
• specifying a resistor for a particular application	Jenneson Electrical Principles 7e	1.28 Resistors							
T8 Series circuits encompassing:									
• circuit diagram of a single-source d.c. 'series' circuit	Jenneson Electrical Principles 7e	1.34 Series (connected) circuits		15, 16	4		2	2	
• Identification of the major components of a 'series' circuit: power supply; loads; connecting leads and switch	Jenneson Electrical Principles 7e	1.34 Series (connected) circuits			4		2		
• applications where 'series' circuits are used in the Electro technology industry	Jenneson Electrical Principles 7e	1.34.2 Where are series circuits used?			4				
• characteristics of a 'series' circuit - connection of loads, current path, voltage drops, power dissipation and affects of an open circuit in a 'series' circuit	Jenneson Electrical Principles 7e	1.35 Characteristics of a series circuit		15, 16	4			2	
• the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities	Jenneson Electrical Principles 7e	1.35 Characteristics of a series circuit	16		4	12, 14		2	
• relationship between voltage drops and resistance in a simple voltage divider network	Jenneson Electrical Principles 7e	1.35 Characteristics of a series circuit	15			13		2	
• setting up and connecting a single-source series dc circuit	Jenneson Electrical Principles 7e	1.35 Characteristics of a series circuit			4	16		2	
• measurement of resistance, voltage and current values in a single source series circuit	Jenneson Electrical Principles 7e	1.35 Characteristics of a series circuit			4			2	
• effect of an open-circuit on a series connected circuit	Jenneson Electrical Principles 7e	1.35 Characteristics of a series circuit			4			2	