UoC: UEENEEE104A - Solve problems in d.c. circuits CIII-Core and CII-Elective

Essential Performance Capabilities (from the 55 EPC's specified by ERAC for an Electrical license) that relate to UEENEEE104A include:

1 Demonstrate a knowledge of basic electrical and energy concepts.
2 Demonstrate a knowledge of the various effects of electric current.
3 Demonstrate a knowledge of resistivity and resistors.
4 Demonstrate a knowledge of the principles
of various sources of electromotive force (e.m.f.).
5 Explain the operation of a simple practical circuit. Determine the resistance, voltage, current and power in any part of a DC circuit using theory and actual measurement methods.

Required skills and knowledge	McGraw Hill Text	Chapter/Heading reference	Test Bank	Quizzes	Cases	Worksheets	PPTs	Interactives	Animations	Prac Manual
T1 Basic electrical concepts encompassing:										
electrotechnology industry	Jenneson, Electrical Principles 7e	1.1 The electrotechnology industry			Q1,2,3,4,5		Slide 1-1			
static and current electricity	Jenneson, Electrical Principles 7e	1.2 Static and current electricity	Q1, Q2, Q3, Q4, Q5, Q6, Q59	Q5, Q6	Q1,2,3,4,5		Slide 1-2		Figure 1.3 Attraction and repulsion between electrical	
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	Q55, Q56	Q2	Q1,2,3,4,5					
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	Q7, Q8, Q9, Q10		Q1,2,3,4,5		Slide 1-3	01a Elementary electricity: Label the components of an electrical		
utilisation of electricity by the various loads	Jenneson, Electrical Principles 7e	1.5 Utilisation of electricity by the various loads	Q11, Q12, Q13		Q1,2,3,4,5		Slide 1-4			
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	Q14, Q15, Q16, Q17		Q1,2,3,4,5		Slide 1-5			
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	Q18, Q19, Q23, Q24	Q3			Slide 1-6, Slide1-16, Slide 1-17			
purpose of each component in the circuit	Jenneson, Electrical Principles 7e	1.5 Utilisation of electricity by the various loads	Q20, Q21, Q22							
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	Q25, Q26, Q27				Slide 1-7, Slide 1-8		Figure 1.13 Light circuits based on a car battery	
multiple and sub-multiple units	Jenneson, Electrical Principles 7e	1.10 Multiple and sub-multiple units		Q35			Slide 1-9			Prac Manual
T3 Ohm's Law encompassing:										
basic d.c. single path circuit	Jenneson, Electrical Principles 7e	1.11 Basic d.c. single-path circuit		Q15			Slide 1-10		connected to a lamp	Prac Manual
voltage and currents levels in a basic d.c. single path circuit	Jenneson, Electrical Principles 7e	1.13 Voltage and current levels in a basic d.c. single-path circuit		Q4			Slide 1-11			Prac Manual
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	Section 1.9 Effects of an open circuit, a closed circuit and a short circuit					Slide 1-12	01b Elementary electricity: Label the six components of a simple metered d.c. circuit.		
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	Q28, Q29, Q30, Q31	Q17			Slide 1-13			Prac Manual
graphical relationships of voltage, current and resistance	Jenneson, Electrical Principles 7e	Section 1.13 Voltage, current and resistance in a circuit								Prac Manual
relationship between voltage, current and resistance	Jenneson, Electrical Principles 7e	Section 1.13 Voltage, current and resistance in a circuit							Figure 4.9 Ohm's triangle	Prac Manual
T4 Electrical power encompassing:										
relationship between force, power, work and energy	Jenneson, Electrical Principles 7e	1.14 Relationship between force, power, energy and work	Q37	Q7	Q2,3		Slide 1-14, UEENEEG102A - Slide 44,45,46,47 and 48			Prac Manual
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	Q38, Q39, Q40, Q41, Q42	Q20	Q2,3		Slide 1-15			Prac Manual
power ratings of devices	Jenneson, Electrical Principles 7e	1.16 Power ratings of devices		Q5	Q2,3		Slide 1-18			Prac Manual
measurement electrical power in a d.c. circuit	Jenneson, Electrical Principles 7e	1.17 Measurement of electrical power in a d.c. circuit	Q43, Q44		Q2,3		Slide 1-19			

effects of power rating of various resistors	Jenneson, Electrical Principles 7e	1.30 Power ratings of a resistor			Q2,3					Prac Manual
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	Q45	Q8			Slide 1-20, Slide 21			
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	Q46, Q47, Q51, Q52	Q3, Q4, Q6, Q9			Slide 1-22			
typical uses of the effects of current	Jenneson, Electrical Principles 7e	1.20 Typical uses of the effects of current	Q48, Q49				Slide 1-23			
mechanisms by which metals corrode	Jenneson, Electrical Principles 7e	1.21 Mechanisms by which metals corrode	Q50	Q4, Q11, Q12			Slide 1-24	02b Electrochemistry: Label the parts of the diagram showing		
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					Slide 1-25			
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)	Q53		Q1,2,3,4,5	Q2	Slide 1-26, Slide 1-27			
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)	Q60, Q61			Q2				
basic principles of producing a emf by the application of sun light falling on the surface of photovoltaic cells	Jenneson, Electrical Principles 7e	3.12.2 Solar energy	Q58	Q1		Q2				
basic principles of generating a emf when a mechanical force is applied to a crystal (piezo electric effect)	Jenneson, Electrical Principles 7e	1.23.15 Piezoelectric sources	Q54, Q62, Q63			Q2				
principles of producing a electrical current from primary, secondary and fuel cells	Jenneson, Electrical Principles 7e	1.24 Principles of producing an electrical current	Q57, Q64, Q65, Q66	Q10, Q13, Q14		Q2		02a Electrochemistry: Label the three main parts of a voltaic cell.	Figure 2.2 Electrolysis cell Figure 11.13 Platinum fuel	
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				Q2	Slide 1-28			
effect of losses in electrical wiring and machines	Jenneson, Electrical Principles 7e	1.26 Effect of losses in electrical wiring and machines				Q2	Slide 1-29			
principle of conservation of energy	Jenneson, Electrical Principles 7e	1.27 Principle of conservation of energy				Q2	Slide 1-30			
T7 Resistors encompassing:										
features of fixed and variable resistor types and typical applications	Jenneson, Electrical Principles 7e	1.28 Resistors 1.29 Variable resistors				Q3,4,5	Slide 1-31, Slide 1-32, Slide 1-33, Slide 1-34			Prac Manual
identification of fixed and variable resistors	Jenneson, Electrical Principles 7e	1.28 Resistors 1.29 Variable resistors				Q3,4,5				Prac Manual
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		Q7		Q3,4,5		05a Resistors: Identify the type for each resistor shown in the drawing.		
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		Q25		Q3,4,5				
characteristics of temperature, voltage and light dependent resistors and typical applications of each	Jenneson, Electrical Principles 7e	1.29.5 Voltage-dependent resistors (VDRs)				Q3,4,5				
power ratings of a resistor	Jenneson, Electrical Principles 7e	1.30 Power ratings of a resistor	Q97			Q3,4,5				Prac Manual
power loss (heat) occurring in a conductor	Jenneson, Electrical Principles 7e	1.31 Power loss (heat) occurring in a conductor		Q3		Q3,4,5				Prac Manual
resistance of a colour coded resistor from colour code tables and confirm the value by measurement	Jenneson, Electrical Principles 7e	1.32 Reading resistors	Q67	Q26, Q33		Q3,4,5		05b Resistors: Identify the correct bands on the four-band		Prac Manual
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				Q3,4,5				
specifying a resistor for a particular application	Jenneson, Electrical Principles 7e	1.33 Selecting a resistor				Q3,4,5				
T8 Series circuits encompassing:										

circuit diagram of a single-source d.c. 'series' circuit	Jenneson, Electrical Principles 7e	1.34 Series (connected) circuits	Q70		Q1,4,5		Slide 1-35			Prac Manual
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			Q1,4,5					Prac Manual
applications where 'series' circuits are used in the Electro technology industry.	Jenneson, Electrical Principles 7e	1.34.2 Where are series circuits used?			Q1,4,5					Prac Manual
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	Q68, Q69, Q71, Q72, Q73, Q74	Q18, Q19, Q32	Q1,4,5		Slide 1-36			Prac Manual
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			Q1,4,5		Slide 1-37, Slide 38			
relationship between voltage drops and resistance in a simple voltage divider network	Jenneson, Electrical Principles 7e	1.35 Characteristics of a series circuit			Q1,4,5		Slide 1-39			
setting up and connecting a single-source series dc circuit	Jenneson, Electrical Principles 7e	1.35 Characteristics of a series circuit			Q1,4,5					
measurement of resistance, voltage and current values in a single source series circuit	Jenneson, Electrical Principles 7e	1.35 Characteristics of a series circuit		Q1, Q2	Q1,4,5			04a d.c. circuits: Fill in the results table for the series circuit		Prac Manual
effect of an open-circuit on a series connected circuit	Jenneson, Electrical Principles 7e	1.35 Characteristics of a series circuit			Q1,4,5					
T9 Parallel circuits encompassing:										
schematic diagram of a single-source d.c. 'parallel' circuit	Jenneson, Electrical Principles 7e	1.36 Parallel connected circuits	Q76		Q3,4,	Q6	Slide 1-40			Prac Manual
major components of a 'parallel' circuit (power supply, loads, connecting leads and switch)	Jenneson, Electrical Principles 7e	1.36.5 Power in parallel circuits			Q3,4,	Q6				
applications where 'parallel' circuits are used in the Electrotechnology industry	Jenneson, Electrical Principles 7e	1.36.2 Voltage in parallel circuits			Q3,4,	Q6				Prac Manual
characteristics of a 'parallel' circuit (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'parallel' circuit)	Jenneson, Electrical Principles 7e	1.36 Parallel connected circuits	Q75, Q77	Q8, Q16	Q3,4,	Q6	Slide 1-41			
relationship between currents entering a junction and currents leaving a junction	Jenneson, Electrical Principles 7e	1.36.3 Current in parallel circuits	Q78		Q3,4,	Q6				
relationship between branch currents and resistances in a two branch current divider network	Jenneson, Electrical Principles 7e	1.36.3 Current in parallel circuits	Q99		Q3,4,	Q6				
calculation of the total resistance of a 'parallel' circuit	Jenneson, Electrical Principles 7e	1.36.2 Voltage in parallel circuits	Q79	Q21	Q3,4,	Q6	Slide 1-43		circuits	
calculation of the total current of a 'parallel' circuit	Jenneson, Electrical Principles 7e	1.36.2 Voltage in parallel circuits			Q3,4,	Q6	Slide 1-43			Prac Manual
calculation of the total voltage and the individual voltage drops of a 'parallel' circuit	Jenneson, Electrical Principles 7e	1.36.2 Voltage in parallel circuits			Q3,4,	Q6				
setting up and connecting a single-source d.c. parallel circuit	Jenneson, Electrical Principles 7e	1.36 Parallel connected circuits			Q3,4,	Q6				
resistance, voltage and current measurements in a single-source parallel circuit	Jenneson, Electrical Principles 7e	1.36 Parallel connected circuits		Q1, Q2	Q3,4,	Q6		04b d.c. circuits: Fill in the results table for the parallel		
voltage, current, resistance or power dissipated from measured values of any of these quantities	Jenneson, Electrical Principles 7e	1.36 Parallel connected circuits			Q3,4,	Q6	Slide 1-42			Prac Manual
output current and voltage levels of connecting cells in parallel	Jenneson, Electrical Principles 7e	1.36 Parallel connected circuits			Q3,4,	Q6				
T10 Series/parallel circuits encompassing:										
schematic diagram of a single-source d.c. 'series/parallel' circuit	Jenneson, Electrical Principles 7e	1.37.3 Equivalent resistance	Q81, Q82		Q4		Slide 1-44		Figure 4.7 Nodes and loops	
major components of a 'series/parallel' circuit (power supply, loads, connecting leads and switch)	Jenneson, Electrical Principles 7e	1.37 Series/parallel circuits	Q80		Q4					
applications where 'series/parallel' circuits are used in the Electrotechnology industry	Jenneson, Electrical Principles 7e	1.37 Series/parallel circuits		Q36	Q4					
characteristics of a 'series/parallel' circuit (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'series/parallel' circuit)	Jenneson, Electrical Principles 7e	1.37 Series/parallel circuits		Q9	Q4					
relationship between voltages, currents and resistances in a bridge network	Jenneson, Electrical Principles 7e	1.37.4 Nodes and loops			Q4					
calculation of the total resistance of a 'series/parallel' circuit	Jenneson, Electrical Principles 7e	1.37.3 Equivalent resistance	Q83		Q4					
calculation of the total current of a 'series/parallel' circuit	Jenneson, Electrical Principles 7e	1.37.3 Equivalent resistance	Q84, Q85		Q4					
calculation of the total voltage and the individual voltage drops of a 'series/parallel' circuit	Jenneson, Electrical Principles 7e	1.37.4 Nodes and loops			Q4					
setting up and connecting a single-source d.c. series/ parallel circuit	Jenneson, Electrical Principles 7e	1.37 Series/parallel circuits			Q4					
resistance, voltage and current measurements in a single-source d.c. series / parallel circuit	Jenneson, Electrical Principles 7e	1.37 Series/parallel circuits			Q4					

the voltage, current, resistances or power dissipated from measured values of any two of these quantities	Jenneson, Electrical Principles 7e	1.37 Series/parallel circuits			Q4					
T11 Factors affecting resistance encompassing:										
four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)	Jenneson, Electrical Principles 7e	1.38 Factors affecting resistance	Q87				Slide 1-45			Prac Manual
affect the change in the type of material (resistivity) has on the resistance of a conductor	Jenneson, Electrical Principles 7e	1.38.4 Type of material (resistivity)								
affect the change in 'length' has on the resistance of a conductor	Jenneson, Electrical Principles 7e	1.38.2 Length		Q22						Prac Manual
affect the change in 'cross-sectional area' has on the resistance of a conductor	Jenneson, Electrical Principles 7e	1.38.3 Cross-sectional area (CSA)		Q23						Prac Manual
effects of temperature change on the resistance of various conducting materials	Jenneson, Electrical Principles 7e	1.38.5 Temperature	Q86	Q24					Figure 5.1 Effect of temperature on resistance	
effects of resistance on the current-carrying capacity and voltage drop in cables	Jenneson, Electrical Principles 7e	1.39 Effects of resistance on the current-carrying capacity and voltage drop in cables					Slide 1-46			Prac Manual
calculation of the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature	Jenneson, Electrical Principles 7e	1.38 Factors affecting resistance								Prac Manual
using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper, aluminium, nichrome, tungsten) when those materials undergo a change in type of material length, cross-sectional area and temperature	Jenneson, Electrical Principles 7e	1.38 Factors affecting resistance								Prac Manual
T12 Effects of meters in a circuit encompassing:										
selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application	Jenneson, Electrical Principles 7e	1.40 Selecting an appropriate meter		Q10			Slide 1-47, Slide 1-55			Prac Manual
measuring resistance using direct, volt-ammeter and bridge methods	Jenneson, Electrical Principles 7e	1.41 Measuring resistance using direct, volt-ammeter and bridge methods	Q90				Slide 1-48			Prac Manual
instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used	Jenneson, Electrical Principles 7e	1.40.3 Sensitivity	Q88				Slide 1-49			Prac Manual
hazards involved in using electrical instruments and the safety control measures that should be taken	Jenneson, Electrical Principles 7e	1.40.4 Internal impedance	Q36							Prac Manual
operating characteristics of analogue and digital meters	Jenneson, Electrical Principles 7e	1.46 Operating characteristics of analogue and digital meters					Slide 1-53			
correct techniques to read the scale of an analogue meters and how to reduce the 'parallax' error	Jenneson, Electrical Principles 7e	1.47 Techniques for reading the scale of an analogue meter					Slide 1-54			Prac Manual
types of voltmeters used in the Electrotechnology industry - bench type, clamp meter, Multimeter, etc	Jenneson, Electrical Principles 7e	1.48 Types of voltmeters used in the electrotechnology industry								
purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter	Jenneson, Electrical Principles 7e	1.48.2 The voltmeter section		Q2						Prac Manual
types of voltage indicator testers (e.g. LED, neon, solenoid, volt-stick, series tester, etc.) and explain the purpose of each voltage indicator tester	Jenneson, Electrical Principles 7e	1.49 Non-contact testing instruments					Slide 1-50, Slide 1-51			
operation of various voltage indicator testers	Jenneson, Electrical Principles 7e	1.49 Non-contact testing instruments					Slide 1-55			
advantages and disadvantages of each voltage indicator tester	Jenneson, Electrical Principles 7e	1.49.1 Voltage testers								
various types of ammeters used in the Electrotechnology industry - bench, clamp meter, multimeter, etc	Jenneson, Electrical Principles 7e	1.42 Instruments used to measure voltage, current, resistance and insulation resistance 1.49.2 Current testers					Slide 1-56			
purpose of an ammeter and the correct connection (series) of an ammeter into a circuit	Jenneson, Electrical Principles 7e	1.12.1 Measuring electricity—devices and units 1.42 Instruments used to measure voltage, current, resistance and insulation resistance	Q32	Q1						Prac Manual
reasons why the internal resistance of an ammeter must be extremely low and the dangers and consequences of connecting an ammeter in parallel and/or wrong polarity	Jenneson, Electrical Principles 7e	1.12.1 Measuring electricity—devices and units 1.45 Hazards involved in using electrical instruments	Q33							Prac Manual

selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application	Jenneson, Electrical Principles 7e	1.40 Selecting an appropriate meter					Slide 1-57			Prac Manual
connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and take various voltage readings	Jenneson, Electrical Principles 7e	1.12.1 Measuring electricity—devices and units	Q34, Q35							Prac Manual
loading effect of various voltmeters when measuring voltage across various loads	Jenneson, Electrical Principles 7e	1.50 Using and selecting an appropriate meter								Prac Manual
using voltage indicator testers to detect the presence of various voltage levels	Jenneson, Electrical Principles 7e	1.50 Using and selecting an appropriate meter								
connecting analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings	Jenneson, Electrical Principles 7e	1.50 Using and selecting an appropriate meter								Prac Manual
T13 Resistance measurement encompassing:										
identification of instruments used in the field to measure resistance (including insulation resistance) and the typical circumstances in which they are used	Jenneson, Electrical Principles 7e	1.51.1 Insulation resistance		Q37		Q1	Slide 1-58			Prac Manual
the purpose of an Insulation Resistance (IR) Tester	Jenneson, Electrical Principles 7e	1.51.2 Battery-powered insulation testers (IR testers)				Q1				
the parts and functions of various analogue and digital IR Tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads)	Jenneson, Electrical Principles 7e	1.51.2 Battery-powered insulation testers (IR testers)	Q91			Q1				
reasons why the supply must be isolated prior to using the IR tester	Jenneson, Electrical Principles 7e	1.51.2 Battery-powered insulation testers (IR testers)				Q1				
where and why the continuity test would be used in an electrical installation	Jenneson, Electrical Principles 7e	1.52.1 Low-value resistance and continuity testers				Q1				
where and why the insulation resistance test would be used in an electrical installation	Jenneson, Electrical Principles 7e	1.52.3 Insulation resistance		Q38		Q1				
the voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c and 1000 V d.c	Jenneson, Electrical Principles 7e	1.52.1 Low-value resistance and continuity testers	Q92			Q1				
AS/NZS3000 Wiring Rules requirements - continuity test and insulation resistance (IR) test	Jenneson, Electrical Principles 7e	1.52.2 Continuity testing	Q89			Q1	Slide 1-59			
purpose of regular IR tester calibration	Jenneson, Electrical Principles 7e	1.51.1 Insulation resistance 1.51.2 Battery-powered insulation testers (IR testers)				Q1				
the correct methods of storing the IR tester after use	Jenneson, Electrical Principles 7e	1.51.6 Care in the use of insulation resistance testers				Q1				
carry out a calibration check on a IR Tester	Jenneson, Electrical Principles 7e									
measurement of low values of resistance using an IR tester continuity functions	Jenneson, Electrical Principles 7e	1.52.1 Low-value resistance and continuity testers				Q1				
measurement of high values of resistance using an IR tester insulation resistance function	Jenneson, Electrical Principles 7e	1.52.3 Insulation resistance				Q1				
volt-ammeter (short shunt and long shunt) methods of measuring resistance	Jenneson, Electrical Principles 7e	1.48.2 The voltmeter section				Q1				Prac Manual
calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)	Jenneson, Electrical Principles 7e	1.48.3 The ammeter section				Q1				Prac Manual
measurement of resistance using volt-ammeter methods	Jenneson, Electrical Principles 7e	1.41.5 Volt-ammeter testing				Q1				Prac Manual
T14 Capacitors and Capacitance encompassing:										
basic construction of standard capacitor, highlighting the: plates, dielectric and connecting leads	Jenneson, Electrical Principles 7e	1.53 Capacitors and capacitance	Q13, Q93			Q7	Slide 1-60			
different types of dielectric material and each dielectric's relative permittivity	Jenneson, Electrical Principles 7e	1.53.6 Dielectric constants				Q7				
identification of various types of capacitors commonly used in the Electrotechnology industry (fixed value capacitors -stacked plate, rolled, electrolytic, ceramic, mica and Variable value capacitors - tuning and trimmer)	Jenneson, Electrical Principles 7e	1.53.3 Capacitor types				Q7	Slide 1-61	07a Capacitators: Identify the type for each capacitor shown below.		
circuit symbol of various types of capacitors: standard; variable, trimmer and polarised	Jenneson, Electrical Principles 7e	1.53.3 Capacitor types				Q7				
terms: Capacitance (C), Electric charge (Q) and Energy (W)	Jenneson, Electrical Principles 7e	1.53.4 Capacitance		Q27, Q34		Q7	Slide 1-62			
unit of: Capacitance (Farad), Electric charge (Coulomb) and Energy (Joule)	Jenneson, Electrical Principles 7e	1.53.4 Capacitance		Q29		Q7				
factors affecting capacitance (the effective area of the plates, the distance between the plates and the type of dielectric) and explain how these factors are present in all circuits to some extent	Jenneson, Electrical Principles 7e	1.53.6 Dielectric constants		Q28		Q7				

how a capacitor is charged in a d.c. circuit	Jenneson, Electrical Principles 7e	1.54 How a capacitor is charged in a direct current circuit				Q7	Slide 1-63			
behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves	Jenneson, Electrical Principles 7e	1.54.2 The time constant				Q7				
the term 'Time Constant' and its relationship to the charging and discharging of a capacitor	Jenneson, Electrical Principles 7e	1.54.2 The time constant	Q95			Q7			Figure 7.5 Capacitor charge and discharge	
calculation of quantities from given information: Capacitance (Q = VC); Energy (W =½CV2); Voltage (V = Q/C)	Jenneson, Electrical Principles 7e	1.55 Calculation of quantities from given information	Q94			Q7				
calculation one time constant as well as the time taken to fully charge and discharge a given capacitor. (? = RC)	Jenneson, Electrical Principles 7e	1.55 Calculation of quantities from given information				Q7				
connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit	Jenneson, Electrical Principles 7e	1.55 Calculation of quantities from given information				Q7				
T15 Capacitors in Series and Parallel encompassing:										
hazards involved in working with capacitance effects and the safety control measures that should be taken	Jenneson, Electrical Principles 7e	1.56 Hazards and safety control measures involved in working with capacitance effects				Q8	Slide 1-52, Slide -1-64			
safe handling and the correct methods of discharging various size capacitors	Jenneson, Electrical Principles 7e	1.56 Hazards and safety control measures involved in working with capacitance effects	Q98			Q8				
dangers of a charged capacitor and the consequences of discharging a capacitor through a person	Jenneson, Electrical Principles 7e	1.56.1 Dangers of a charged capacitor				Q8				
factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent	Jenneson, Electrical Principles 7e	1.56 Hazards and safety control measures involved in working with capacitance effects				Q8				
effects of capacitors connected in parallel by calculating their equivalent capacitance	Jenneson, Electrical Principles 7e	1.57 Effects of capacitors connected in parallel	Q96			Q8	Slide1-65		Figure 7.2 Capacitors in parallel	
effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance	Jenneson, Electrical Principles 7e	1.58 Effects on the total capacitance of capacitors connected in series		Q30		Q8	Slide1-66		Figure 7.1 Capacitors in series	
Connecting capacitors in series and/or parallel configurations to achieve various capacitance values	Jenneson, Electrical Principles 7e	1.58 Effects on the total capacitance of capacitors connected in series				Q8	UEENEEG102A - Slide 27,28, 29, 41 and 42			
common faults in capacitors	Jenneson, Electrical Principles 7e	1.56.2 Capacitor faults				Q8				
testing of capacitors to determine serviceability	Jenneson, Electrical Principles 7e	1.56.4 Testing capacitors		Q31		Q8				
application of capacitors in the Electrotechnology industry	Jenneson, Electrical Principles 7e	1.59 Application of capacitors in the electrotechnology industry				Q8	Slide 1-67			