EDEXCEL NATIONALS
UNIT 5 - ELECTRICAL AND ELECTRONIC PRINCIPLES

ASSIGNMENT No.1 - RESISTOR NETWORKS

NAME:

I agree to the assessment as contained in this assignment. I confirm that the work submitted is my own work.

Signature Date submitted

Learning outcomes

On completion of this unit a learner should:
1 Be able to use circuit theory to determine voltage, current and resistance in direct current (DC) circuits
2 Understand the concepts of capacitance and determine capacitance values in DC circuits
3 Understand the principles and properties of magnetism
4 Understand single-phase alternating current (AC) theory.

FEEDBACK COMMENTS

This assignment assesses P1, P2 and M1.

Grade Awarded:

Assessor Signature_____ Date:_____

Internal verifier Signature_____ Date:_____

Grading grid

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all of the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:	**Achieved**	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**Achieved**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	**Achieved**
P1 use DC circuit theory to calculate current, voltage and resistance in DC networks		**M1** use Kirchhoff's laws to determine the current in all the branches of a network containing two voltage sources, five nodes and power dissipated in a load resistor		**D1** analyse the operation and the effects of varying component parameters of a power supply circuit that includes a transformer, diodes and capacitors	
P2 use a multimeter to carry out circuit measurements in a DC network		**M2** evaluate capacitance, charge, voltage and energy in a network containing a series-parallel combination of three capacitors		**D2** evaluate the performance of a motor and a generator by reference to	
P3 compare the forward and reverse characteristics of two different types of semi-conductor diode		**M3** compare the results of adding and subtracting two sinusoidal AC waveforms graphically and by phasor diagram.			
P4 describe the types and function of capacitors					
P5 carry out an experiment to determine the relationship between the voltage and current for a charging and discharging capacitor					
P6 calculate the charge, voltage and energy values in a DC network that includes a capacitor					
P7 describe the characteristics of a magnetic field and explain the relationship between flux density (B) and field strength (H)					
P8 describe the principles and applications of electromagnetic induction					
P9 use single phase AC circuit theory to explain and determine the characteristics of a sinusoidal AC waveform					
P10 use an oscilloscope to measure and determine the inputs and outputs of a single phase AC circuit.					

PART 1 VIDEO ASSIGNMENT ON RESISTORS

After watching the video on electrical resistors, answer the following questions.

1. Describe the construction of a carbon resistor.

_____

_____

_____

2. Describe the construction of a wire wound resistor.

_____

_____

_____

3. Describe the construction of a metal oxide film resistor.

_____

_____

_____

4. Draw the symbol for a fixed resistor. 5. Draw the symbol for a variable resistor.

6. What is the main reason for using a wire wound resistor?

_____

_____

_____

7. Write down the colour code for a value 22kΩ.

_____

8. Write down the colour code for a 47kΩ resistor.

_____

9. What is the value of a resistor with coloured bands of red, green and blue?

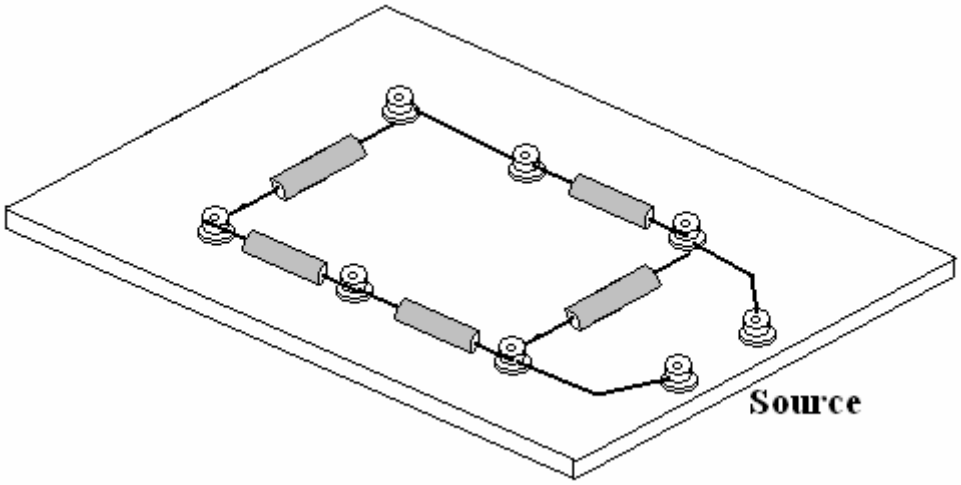
_____

10. What colour indicates a tolerance of plus or minus 2% _____

PART 2 RESISTANCE NETWORK

This part must be written up as a separate report.

The student has a circuit board with a suitable resistance network with the facility for safely measuring the voltage and current at key points. A typical circuit is shown. A safe source must be used and it is advisable to use a Perspex cover with holes for inserting probes.



TASK 1

Examine the network fixed on the board and sketch the circuit.

- *Deduce the total resistance.*
- *Measure the total resistance and comment on the accuracy of the two figures.*

TASK 2

- *Measure the total current from the source and the source voltage at the same time.*
- *Calculate the theoretical current and compare the theoretical and practical values.*

TASK 3

- *Calculate and check the voltage across a designated resistor. Comment on the two figures.*

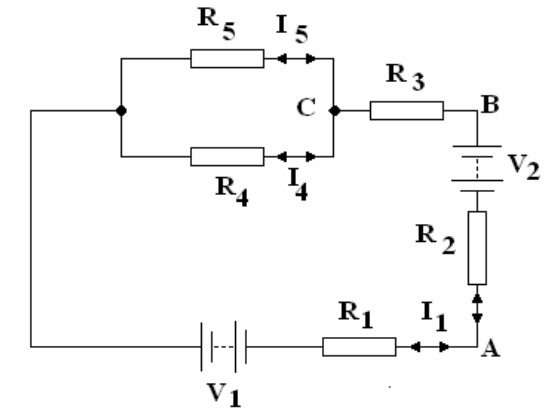
PART 3 **TEST QUESTION ON RESISTOR NETWORK**

The circuit shows a resistor network with two d.c. voltage sources. Solve the following and hand in your solution for marking. Note the polarity of the batteries. You will be allocated a set of data by your tutor.

1. ***Calculate the currents I_1 ,I_5 and I_4.***

2. ***Calculate the voltage at A, B and C.***

3. ***Calculate the power dissipated as heat in the circuit.***



STUDENT	R_1	R_2	R_3	R_4	R_5	V_1	V2
1	20	10	15	20	25	12	6
2	12	24	15	10	20	24	6
3	2	4	5	10	2	10	5
4	0.4	0.2	0.5	1	5	12	3

A Mathcad programme for solving various combinations is available for tutors from admin@wwww.freestudy.co.uk