EDEXCEL NATIONALS
UNIT 5 - ELECTRICAL AND ELECTRONIC PRINCIPLES

ASSIGNMENT No.3 - ELECTRO MAGNETIC INDUCTION

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 P7 and P8.

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 electrical theory.	
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.					

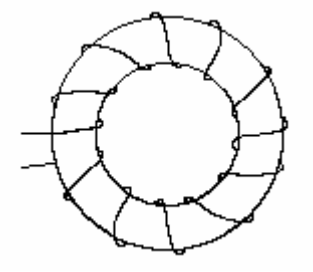
DETAILS

You should take no more than two weeks to do the work.

PART 1

List four industrial devices that use magnets. For each, briefly describe the device and explain the magnetic circuit. Diagrams will be very desirable.

PART 2



Complete the following problem using the data set allotted to you.

A magnetic circuit consists of a metal ring with a single coil wound on it as shown.

Calculate the total m.m.f. and hence the current required to produce the given flux.
Calculate the inductance (L) of the coil.
A= Cross sectional area.
l = length of metal path.
ϕ = flux Wb

STUDENT	A mm^2	l mm	ϕ μWb	Turns	Metal type
1	225	250	180	200	Cast iron
2	175	400	250	300	Mild steel
3	210	300	300	400	Stalloy
4	200	350	200	500	Cast steel
5	100	420	75	230	Cast iron
6	250	500	300	1000	Mild steel
7	300	200	430	800	Stalloy
8	290	310	280	450	Cast steel
9	100	225	75	230	Cast iron
10	120	330	200	320	Mild steel

PART 3

A second coil with 500 turns is wound on top of the first coil to make simple transformer. This coil forms the secondary winding and the first coil the primary winding.

The secondary must supply 12 V r.m.s. and 150 mA r.m.s. Determine the following.

- ***The theoretical voltage at the primary terminals.***
- ***The theoretical primary current.***
- ***The theoretical power input.***

Explain why in practice the calculated answers will be different.