QUESTION 1

1. Write down the correct assertion in the attached answer sheet provided
    1.1. An atom that has lost or gained electrons is referred to as   (1)
        a. Valence electron
        b. Atomic structure
        c. Positive ION
        d. ION
        e. Negative ION
    1.2. Why is the emf always greater than the potential difference   (1)
        a. Because it is the voltage measured by the battery
        b. Because it is the voltage drop measured across the load in a circuit
        c. Because it the greatest voltage flowing in a circuit
        d. Because it is the electromotive force
        e. Because it is the greatest voltage produced by a power source
    1.3. The current flowing in a circuit, being directly proportional to the applied voltage and inversely proportional to the resistance, provided that temperature is constant is a statement for the following expression: (1)
        a. $E = P \times t$
        b. $R_t = R_1 + R_2 + R_3$
        c. $V = I \times R$
        d. $L_1 + L_2 + L_3 = L_t$
        e. None of the above
    1.4. The final resistance of material after rise in temperature from 0^oC depends upon one these factors: (1)
        a. Temperature coefficient of the material
        b. Positive temperature coefficient of resistance
        c. Low coefficient resistance
        d. Flux density
        e. The amount of copper conductor
    1.5. Which rule is used to identify the poles of a magnetic field   (1)
        a. Ohm's law rule
        b. Fleming's left-hand rule
        c. The right-hand rule
        d. The right-hand grip rule
        e. The screw rule
    1.6. A primary cell cannot be charged once its chemicals are used up and must be replaced. One of the following is a primary cell only: (1)
        a. Lead-acid cell
        b. Nickel-cadmium cell
        c. Nickel-iron cell
        d. Mercury cell
        e. Carbon-zinc cell
    1.7. Capacitors come in polarised and non-polarized types. One of the following characteristic describes a non-polarized capacitor   (1)
        a. High capacitance
        b. Low capacitance
        c. High working voltage
        d. Polarity is important
        e. High leakage current

1.8. One of the following statements is a factor that influence the inductance of an inductor (1)
   a. The number of turns on the coil
   b. The distance between the plates
   c. The type of insulating material
   d. Size of the plates
   e. None of the above

1.9. The phase difference between different lines in a three-phase system is: (1)
   a. 360°
   b. 120°
   c. 180°
   d. 90°
   e. 45°

1.10. In a three-phase connections: (1)
   a. Line current is equal to phase current in a delta connection
   b. Line voltage is equal to phase voltage in a star connection
   c. There is no line voltage
   d. There is no phase current
   e. Line voltage is equal to phase voltage in a delta connection

[10 marks]

QUESTION 2

2.1. A relay is one the applications of electromagnetism. Refer to the figure below and explain how electromagnetism is achieved in order to operate the LAMP (5)
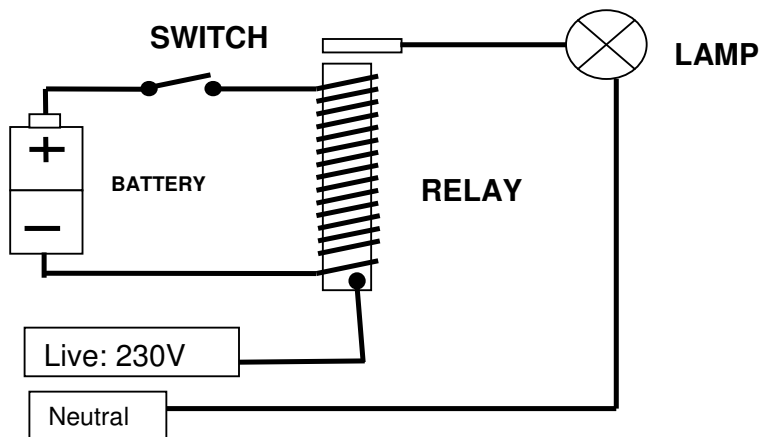

2.2. In the second law of magnetism, how is the force is THREE aspects when exerted by one pole onto the other (3)

2.3. There are many factors that influence the magnitude of the force exerted on a current-carrying conductor placed inside a magnetic field. List FOUR such factors (4)

2.4. In south Africa, electricity is usually distributed by means of three-phase, four-wire system with tolerance of ±10%. Provide the following

2.4.1. State four advantages of three-phase supply over single-phase supply (4)

2.4.2. Explain what you understand by (230V/400V) with tolerance of ±10% (4)

[20 marks]

3. QUESTION 3

3.1. The resistance of a coil of copper wire at 0^oC is 50Ω. Calculate the resistance of the coil at 60^oC. Take the temperature coefficient of resistance of copper wire at 0^oC as $4,3\times10^{-3}/^oC$

(3)

3.2. refer to the diagram below and calculate the following:
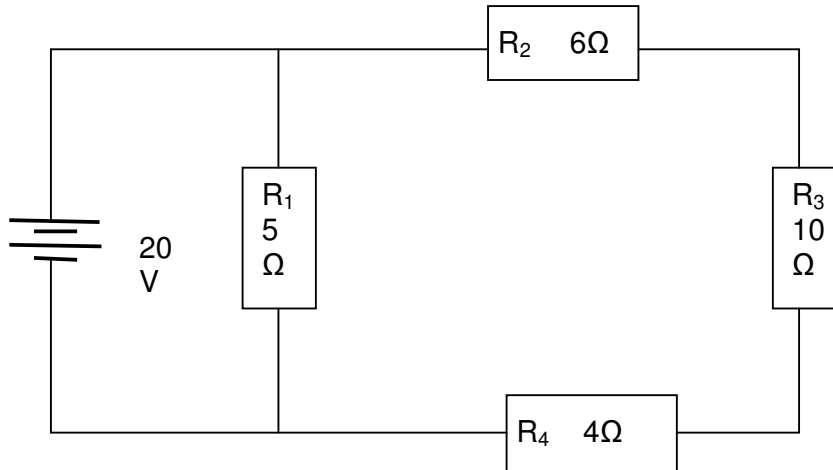
3.2.1. the total resistance of the circuit (2)
3.2.2. the total current of the circuit (2)
3.2.3. the current flowing through the R_3 (2)

3.3. A conductor of 200cm in length and carrying a current of 4A is placed at right angles to a magnetic field having a flux density of 10T. Calculate:
3.3.1. The force on the conductor (2)
3.3.2. The force if the conductor is at an angle of 45° to the direction of the field (2)

3.4. Three capacitors are connected in series across a 230V supply. The value of the capacitors is 2µF, 4µF and 8µF. Calculate:
3.4.1. The total capacitance (2)
3.4.2. The charge on each capacitor (2)
3.5. A 50KW three-phase AC motor is connected in delta through a supply voltage of 415V. If the power factor is 0,85. Calculate:
3.5.1. The phase voltage (1)
3.5.2. The phase current of the motor (2)

[20 marks]

TOTAL: 50 MARKS

ATTACHED ANSWER SHEET FOR QUESTION 1

	Write down Corresponding letter	Write down Correct assertion (answer)
1.1		
1.2		
1.3		
1.4		
1.5		
1.6		
1.7		
1.8		
1.9		
1.10		
TOTAL		**/10**