E-NOTE FOR WEEK 4 OF TERM 3 2020 SESSION

NAME OF TEACHER: ADEJOBI O. T

TERM/ WEEK : THREE / WEEK 3

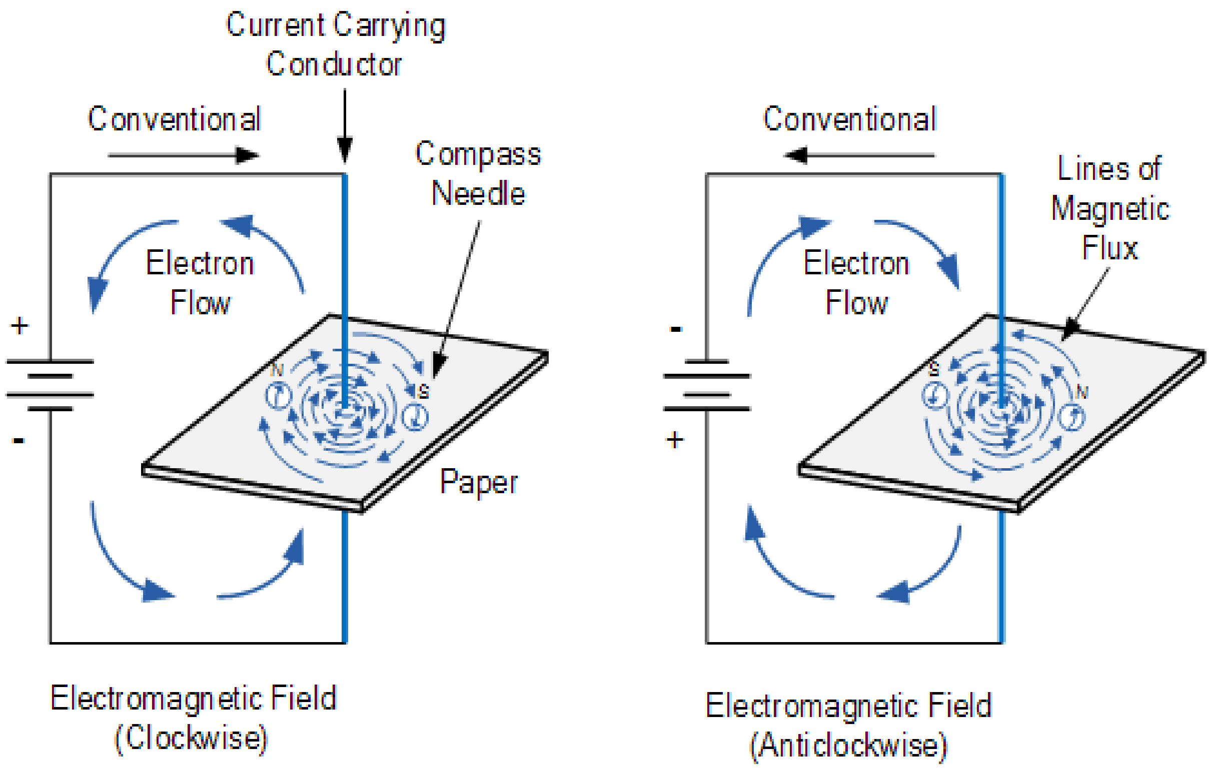
SUBJECT: PHYSICS

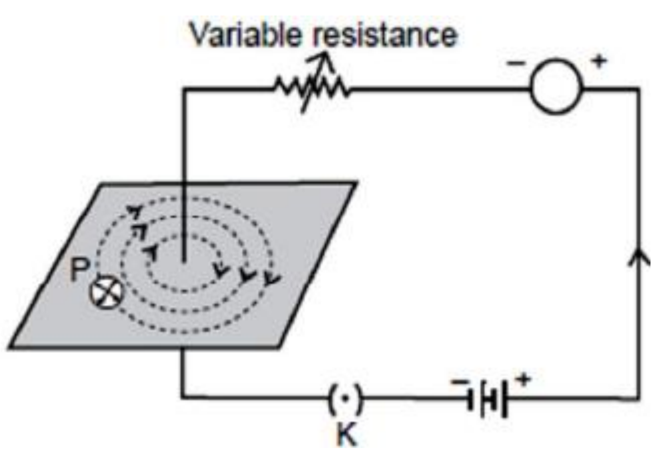
CLASS: SS 2

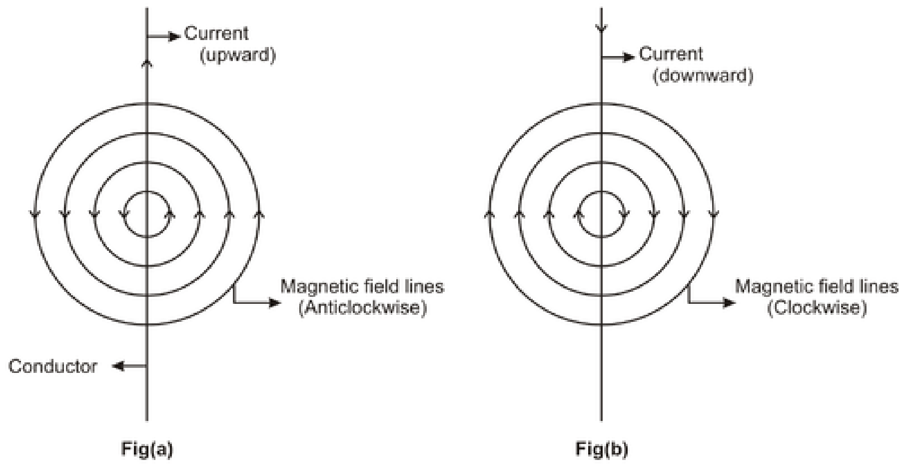
TOPIC: MAGNETIC EFFECT OF ELECTRIC CURRENT

MAGNETIC EFFECT OF ELECTRIC CURRENT

When current passes through a metallic conductor, there is a magnetic effect generated due the movements of electrons round the closed circuit., and this can be shown in the diagram below

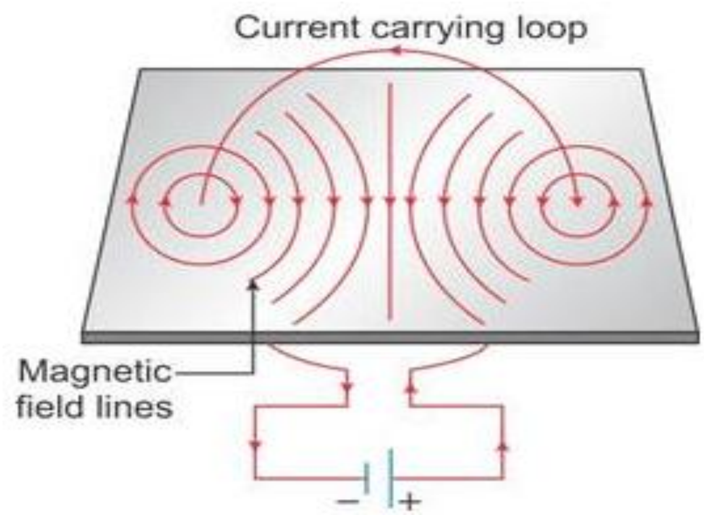


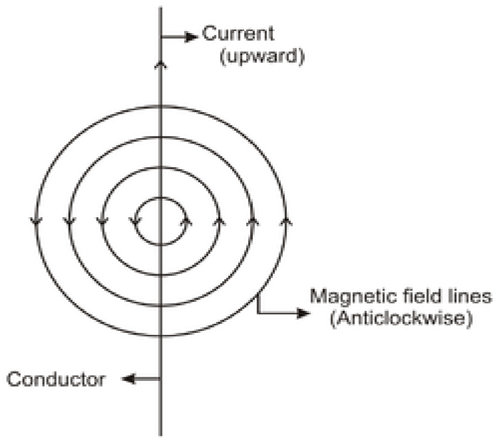




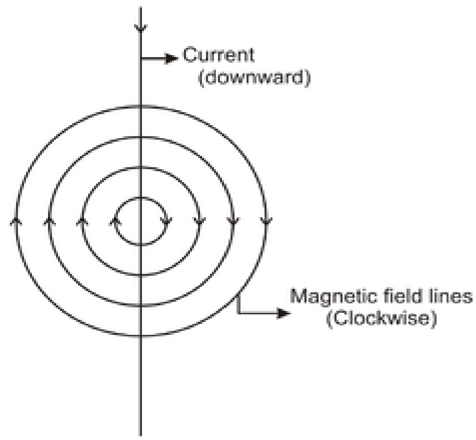
This is has shown in the diagram above, when iron fillings are sprinkled on a paper and current where made to pass through the paper as shown, the iron fillings arranged themselves in concentric circles round the wire, this shows that a magnetic effect is generated due to the passage of current round the wire.

When current passes through a loop of wire, the magnetic effect is as shown below

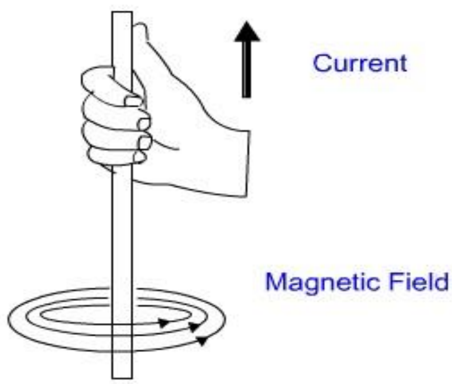


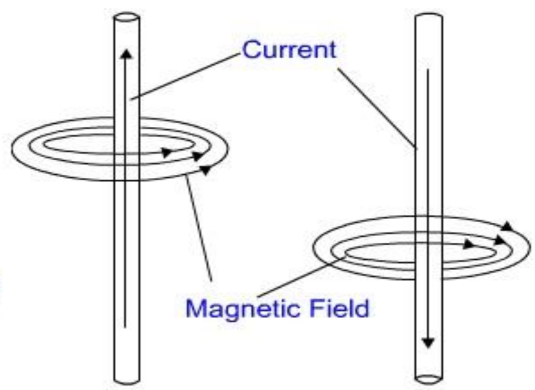


Fig(a)

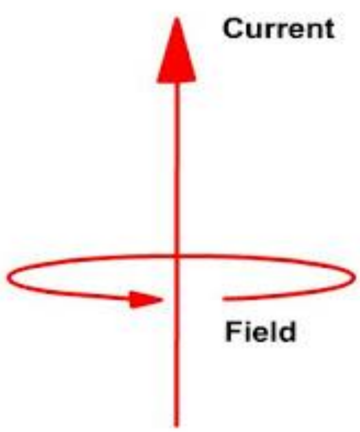


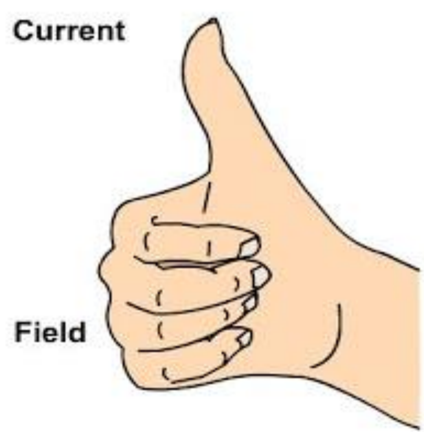
Fig(b)

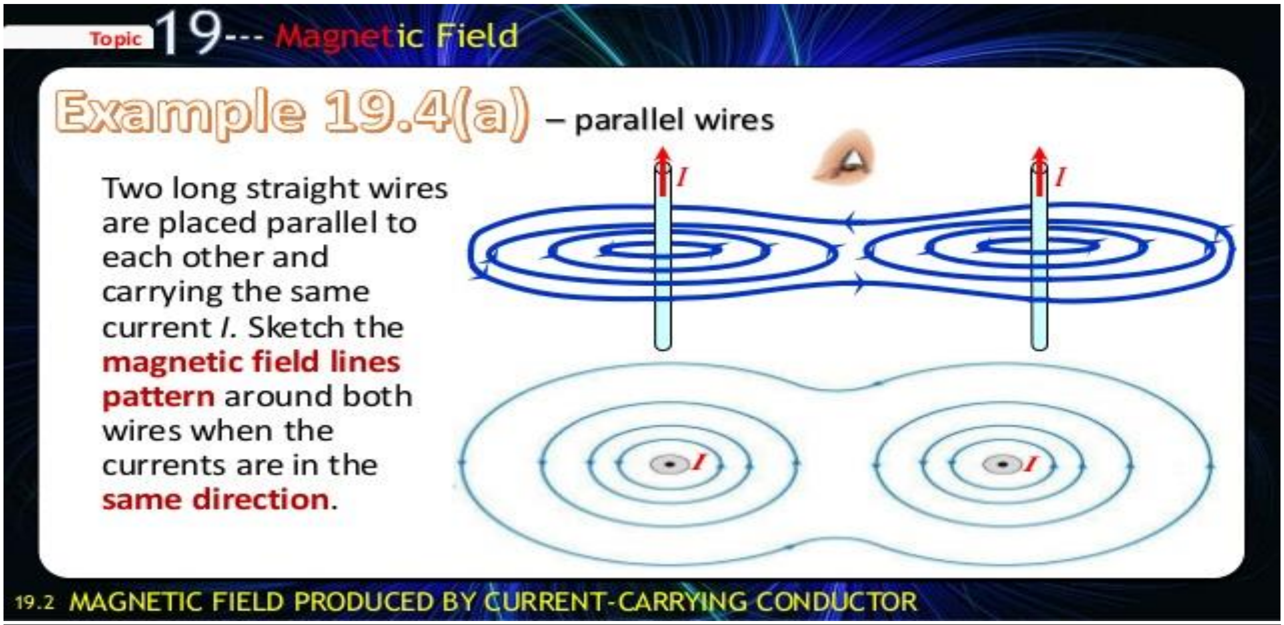


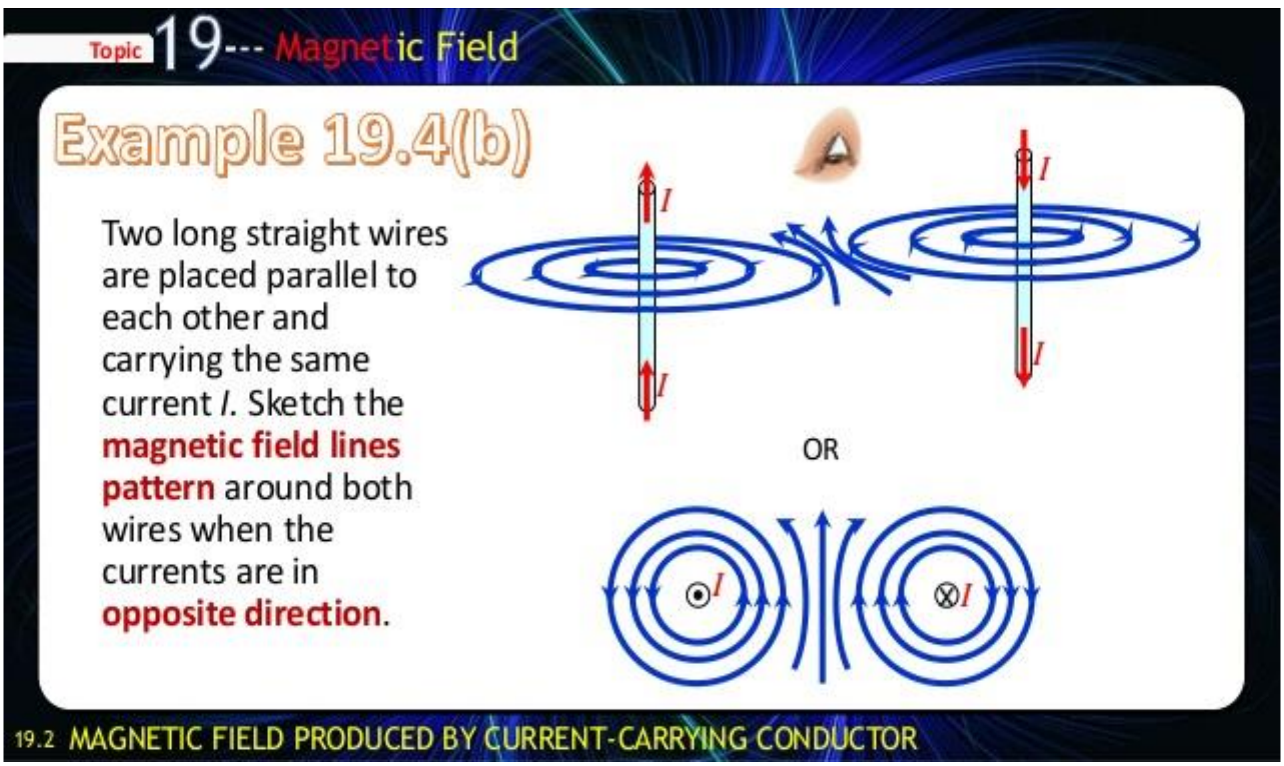


The Right Hand Grip Rule

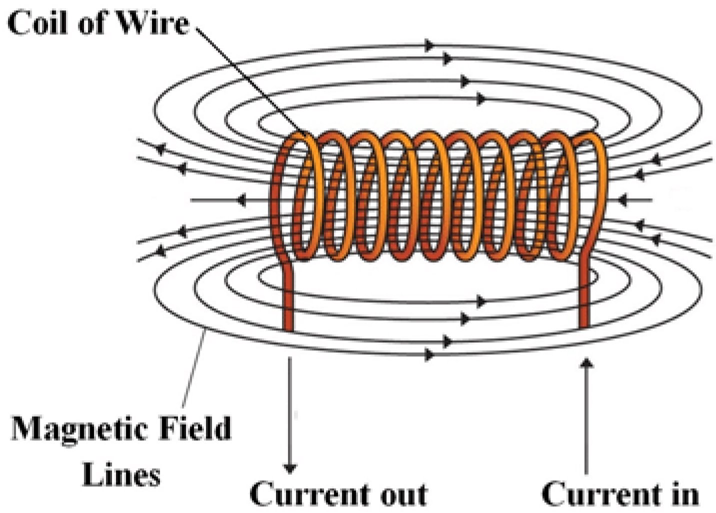





Topic 19--- Magnetic Field
Example 19.4(a) – parallel wires
Two long straight wires are placed parallel to each other and carrying the same current I. Sketch the magnetic field lines pattern around both wires when the currents are in the same direction.
I
I
I
I
19.2 MAGNETIC FIELD PRODUCED BY CURRENT-CARRYING CONDUCTOR


Topic 19--- Magnetic Field
Example 19.4(b)
Two long straight wires are placed parallel to each other and carrying the same current I. Sketch the magnetic field lines pattern around both wires when the currents are in opposite direction.
I
I
I
I
OR
I
I
19.2 MAGNETIC FIELD PRODUCED BY CURRENT-CARRYING CONDUCTOR

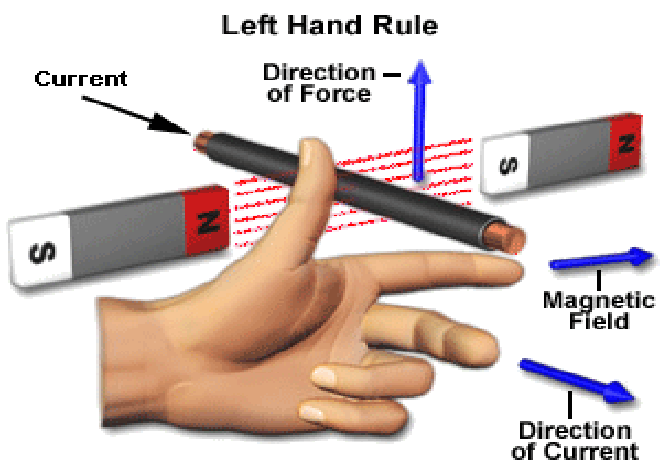
MAGNETIC FIELD PATTERN ROUND A COIL OF WIRE

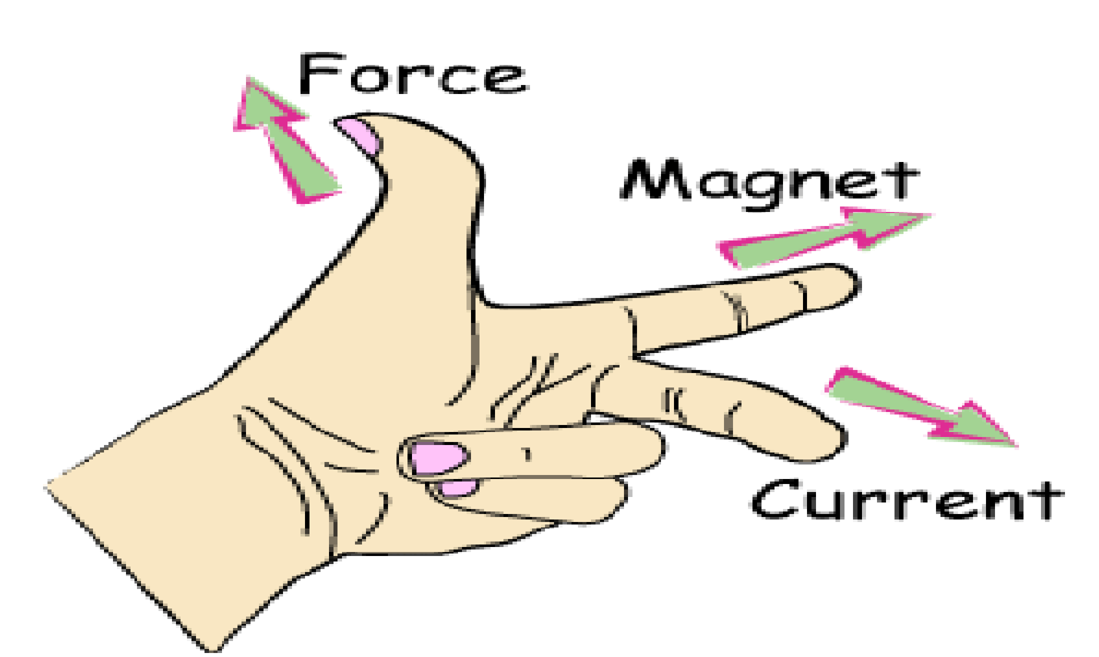


Fleming's left hand rule,

The direction of force on a current carrying conductor placed perpendicular to the magnetic fiel is given by Fleming's left hand rule, which states that

"if the thumb, forefinger and the middle finger are held mutually at right angle to one another with the fore-finger pointing in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of the direction of motion of force producing motion"





Force Experienced

The force F experienced on the wire can be shown to be proportional to the following

1 Current I flowing in the conductor

2 the length l of the conductor in the field

3 the sine of the angle that the conductor makes with the field

4 the strength of the field known as flux density.

The force is given by the equation:

$$F = BIL\sin\Theta$$

EXAMPLE 1

The force experience by a current carrying conductor of length 100cm is 2.0cm. Calculate the current in the conductor if its flowing in a direction 45^0 with the field of 1.0T

SOLUTION.

From the equation

$$F = BIL\sin\Theta$$

$$F = 1 \times I \times 10^{-2} \times 100 \times \sin 45^0$$

$I = 2/\sin 45^0$

$= 2.83A$

NOTE THAT

The greatest force exist when $\Theta = 90^0$ i.e when the conductor is at right angle to the field . The unit of B is tesla or Weber per meter square (Wbm^{-2})

DEFINITION:

One tesla is defined as force per omit length on a wire carting a current of one ampere at right angle to the field.

The magnetic flux (Φ) passing through a surface is BA, where A is the area of the surface at right angle to the field, $\Phi = BA$

Magnetic flux is measured in Webers (Wb)

$$\Phi = BA\cos\Theta$$

Click the link below to watch a video on this topic

https://www.youtube.com/watch?v=v7hWt9F3WcY

ALL THE QUESTIONS HERE ARE FOR PRACTICE, YOUR ASSIGNMENT IS ON THE ASSIGNMENT PAGE.

PLEASE TAKE NOTE