INTRODUCTION

Although the lines of magnetic flux have no physical existence, they do form a very convenient and useful basis for explaining various magnetic effects and to calculate the magnitudes of various magnetic quantities. The complete closed path followed by any group of magnetic flux lines is referred as magnetic circuit. The lines of magnetic flux never intersect, and each line forms a closed path. Whenever a current is flowing through the coil there will be magnetic flux produced and the path followed by the magnetic flux is known as magnetic circuit. The operation of all the electrical devices like generators, motors, transformers etc. depend upon the magnetism produced by this magnetic circuit. Therefore, to obtain the required characteristics of these devices, their magnetic circuits have to be designed carefully.

Magneto Motive Force (MMF)

The magnetic pressure which sets up or tends to set up magnetic flux in a magnetic circuit is known as MMF.

1. Magneto motive force is the measure of the ability of a coil to produce flux.
2. The magnetic flux is due to the existence of the MMF caused by a current flowing through a coil having no. of turns.
3. A coil with 'N' turns carrying a current of 'I' amperes represents a magnetic circuit producing an MMF of NI   MMF=NI
4. Units of MMF = Ampere turns(AT)

Magnetic Flux:

1. The amount of magnetic lines of force set-up in a magnetic circuit is called magnetic flux.
2. The magnetic flux, that is established in a magnetic circuit is proportional to the MMF and the proportional constant is the reluctance of the magnetic circuit.
3. The unit of magnetic flux is   Weber.

Reluctance:

1. The opposition offered to the flow of magnetic flux in a magnetic circuit is called reluctance

2. Reluctance of a magnetic circuit is defined as the ratio of magneto motive force to the flux established.

3. Reluctance depends upon length(l), area of cross-section(a) and permeability of the material that makes up the magnetic circuit.(S l, S   a, S l/a)

$$S = \frac{l}{\mu a}$$

$$RELUCTANCE = \frac{MMF}{FLUX}$$

4. The unit of reluctance is AT/Wb

Magnetic field strength(H)

1. If the magnetic circuit is homogeneous, and of uniform cross-sectional area, the magnetic field strength is defined as the magneto motive force per unit length of magnetic circuit.

$$H = \frac{MMF}{LENGTH} = \frac{NI}{l}$$

2. The unit of magnetic field strength is AT/m

Magnetic flux density(B)

1. The magnetic flux density in any material is defined as the magnetic flux established per unit area of cross-section.

1. The unit of magnetic flux density is wb/m^2 or TESLA

Relative permeability

1. It is defined as the ratio of flux density established in magnetic material to the flux density established in air or vacuum for the same magnetic field strength.