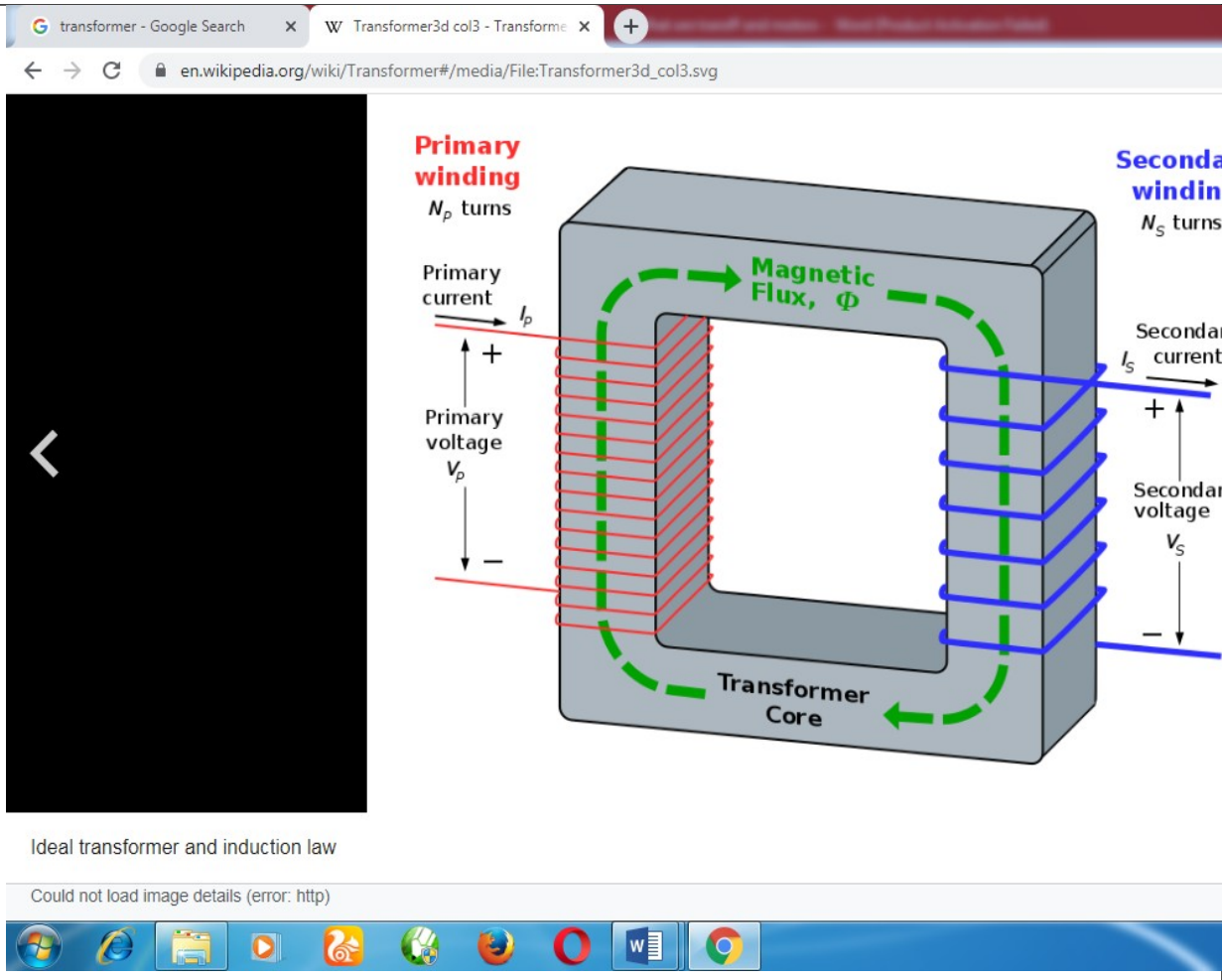
LESSON ONE

TOPIC: TRANSFORMER : MEANING, SCOPE AND DESCRIPTION

OBJECTIVES: At the end of this lesson, students should be able to:

1. Explain the concept of Transformer.
2. Explain the Principle of Operation of Transformer.
3. Explain the uses of electrical transformer.
4. Discuss the major Characteristics of Transformer

START WITH LONG SHOT (LS) MOVE TO CLOSE UP (CU) FOR EMPHASIS	**THE MEANING OF TRANSFORMER, SCOPE AND DESCRIPTION**



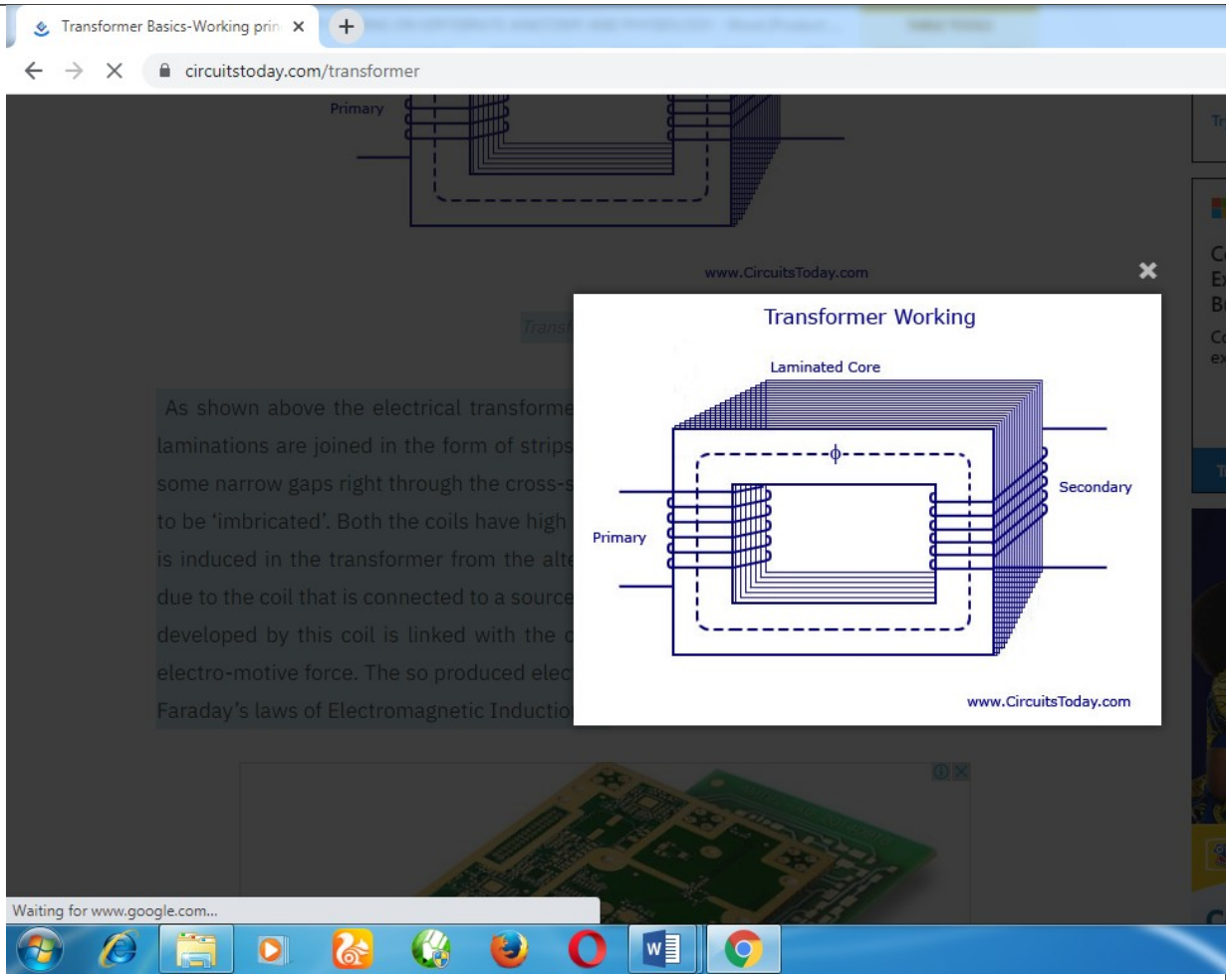
NARRATION

TRANSFORMER

A transformer is a passive component that transfers electrical energy from one electrical circuit or multiple circuit. A transformer are most commonly used for increasing low AC voltage at h up transformer) .Transformer is also used for transmission, distribution and utilization of a electric.t It is most commonly used to increase (step-up) or decrease (step-dawn) voltage level b

WORKING PRINCIPLE OF TRANSFORMER

START WITH LONG SHOT (LS) MOVE TO	It works on the principle of **Faraday's Law of Electromagnetic Induction** which states tha voltage is directly proportional to the rate of change of flux." **Transformer – Working Principle** The main principle of operation of a transformer is mutual inductance between two circuits common magnetic flux. A basic transformer consists of two coils that are electrically separate a magnetically linked through a path of reluctance. The working principle of the transformer ca the figure below.

CLOSE UP (CU) FOR EMPHASIS	 Transformer Working As shown above the electrical transformer has primary and secondary windings. The core lam the form of strips in between the strips you can see that there are some narrow gaps right throug the core. These staggered joints are said to be 'imbricated'. Both the coils have high mutual electro-motive force is induced in the transformer from the alternating flux that is set up in the l the coil that is connected to a source of alternating voltage. Most of the alternating flux dev linked with the other coil and thus produces the mutual induced electro-motive force. The motive force can be explained with the help of Faraday's laws of Electromagnetic Induction as

NARRATION

An electrical transformer uses Faraday's electromagnetic induction law to work – "Rate of change of flux li
time is directly proportional to the induced EMF in a conductor or coil".

A transformer's physical basis lies in the mutual induction between two circuits that are linked by a commo
usually equipped with 2 windings: primary and secondary. These windings share a magnetic core that is lami

induction that takes place between these circuits helps transfer electricity from one point to another.
Depending on the amount of linked flux between the primary and secondary windings, there will be different r
linkage. To ensure maximum flux linkage, i.e. maximum flux passing through and linking to the seconda
primary, a low reluctance path is placed common

to both windings. This leads to greater efficiency in working performance, and forms the core of the transforme
The application of alternating voltage to the windings in the primary side creates an alternating flux in the
windings to induce EMF in the primary as well as the secondary side. EMF in the secondary winding causes
load current, if there is a load connected to the secondary section.
This is how electrical transformers deliver AC power from one circuit (primary) to another (secondary), throu
electrical energy from one value to another, changing the voltage level but not the frequency.

CONSTRUCTION OF AN ELECTRICAL TRANSFORMER

NARATION

The three important components of an electrical transformer are a magnetic core, primary winding, and sec
primary winding is the part that is connected to an electrical source, from where magnetic flux is initially prod
insulated from each other and the main flux is induced in the primary winding from where it is passed to th
linked to the transformer's secondary winding through a low reluctance path.
The core relays the flux to the secondary winding to create a magnetic circuit that closes the flux, and a lo
placed within the core to maximize flux linkage. The secondary winding helps complete the movement of the
primary side, and using the core reaches the secondary winding. The secondary winding is able to pick mon
windings are wound on the same core and hence their magnetic fields help to create motion. In all the types
magnetic core is assembled by stacking laminated steel sheets leaving the minimum required air-gap betwee
continuity of the magnetic path.

START WITH LONG SHOT (LS)	

MOVE TO CLOSE UP (CU) FOR EMPHASIS	

NARRATION

THE FIVE (5) MAJOR CHARACTERISTICS OF TRANSFORMER

Main Characteristics of a Transformer

All transformers share some common features regardless of their type:

- **The frequency of input and output power is the same**
- **All transformers make use of electromagnetic induction laws**
- **The primary and secondary coils are devoid of electrical connection (except for auto transforme power is through magnetic flux.**
- **No moving parts are required to transfer energy, so there are no friction or windage losses as devices.**
- **The losses that do occur in transformers are smaller than those in other electrical devices, and inc**
  - **Copper loss (electrical power lost in the heat created by circulation of currents around t considered the heaviest loss in transformers)**
  - **Core loss (eddy current and hysteresis losses, caused by lagging of magnetic molecules alternating magnetic flux within the core)**

Most transformers are very efficient, delivering between 94% to 96% energy at full load. Very high ca may deliver up to 98%, especially if they operate with constant voltage and frequency.

NARATION

THE USES OF ELECTRIC TRANSFORMER

The major uses of an electrical transformer include:

- Raising or lowering the voltage level in the circuit of an AC.

- Increasing or decreasing the value of an inductor or capacitor in an AC circuit.
- Preventing the passage of DC from one circuit to another.
- Isolating two electric circuits.

Stepping up the voltage level at the site of power generation before the transmission and distribution can tal