

SNS COLLEGE OF ENGINEERING

Coimbatore

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC
with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna
University, Chennai

DEPARTMENT OF ELECTRONICS & ELECTRONICS ENGINEERING

ELECTRICAL ENGINEERING & INSTRUMENTATION

II YEAR/ III SEMESTER

UNIT 2 – TRANSFORMERS

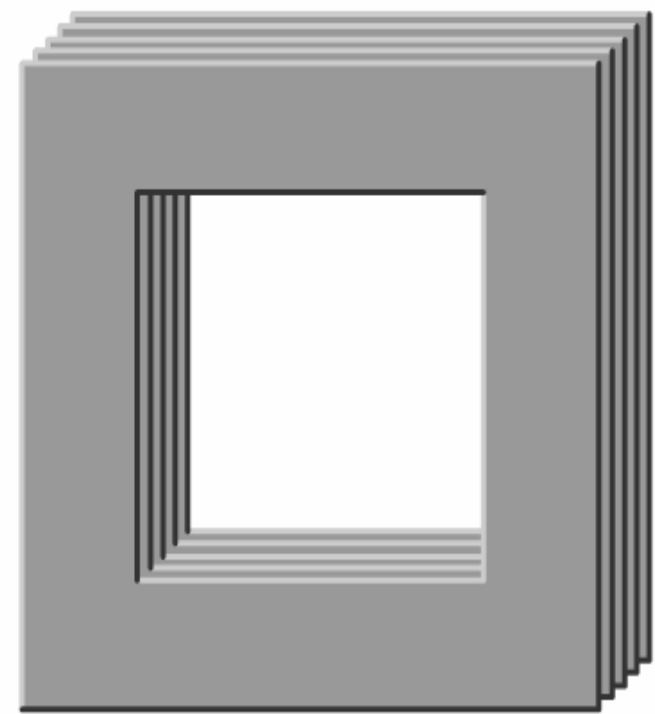
TOPIC 2 – INTRODUCTION- SINGLE PHASE TRANSFORMER CONSTRUCTION

OVERVIEW

- FARADAYS LAW
- CONSTRUCTION
- PRINCIPLE OF OPERATION
- SINGLE PHASE TRANSFORMER
- PRINCIPLE OF OPERATION
- TYPES OF TRANSFORMER

PRINCIPLE OF OPERATION-FARADAY'S LAW

Any Change in the magnetic field of a coil of wire will cause an EMF to be induced in the coil. This EMF induced is called induced EMF and if conductor circuit is closed, the current will also circulate through the circuit and this current is called induced current



EMF INDUCED IN COIL :-

$$e = -N \frac{d\phi}{dt}$$

\swarrow Number of turns in the coil. \searrow Rate of change of flux with time

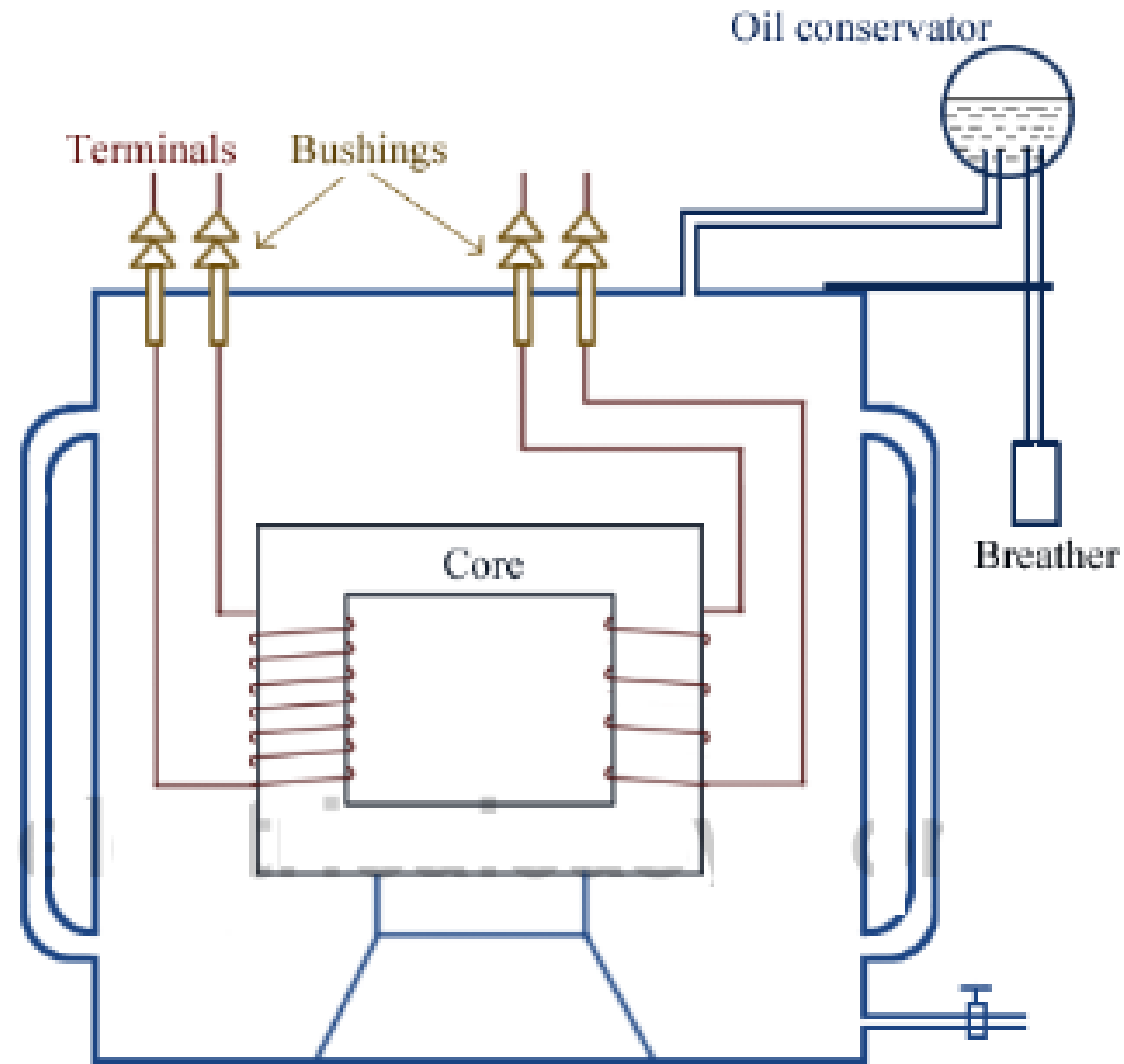
EMF INDUCED IN CONDUCTOR :-

$$e = Blv$$

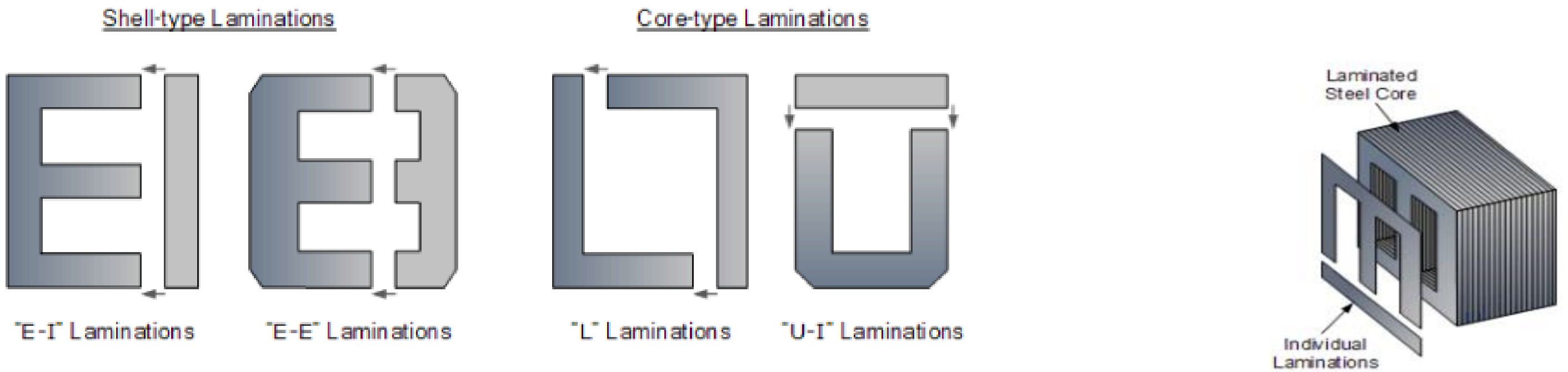
\rightarrow Length of the conductor \rightarrow velocity at which conductor moves m/s

\downarrow Flux density $\rightarrow \frac{\phi}{Ac}$ \rightarrow Flux
 \rightarrow Cross section area of conductor

CONSTRUCTION

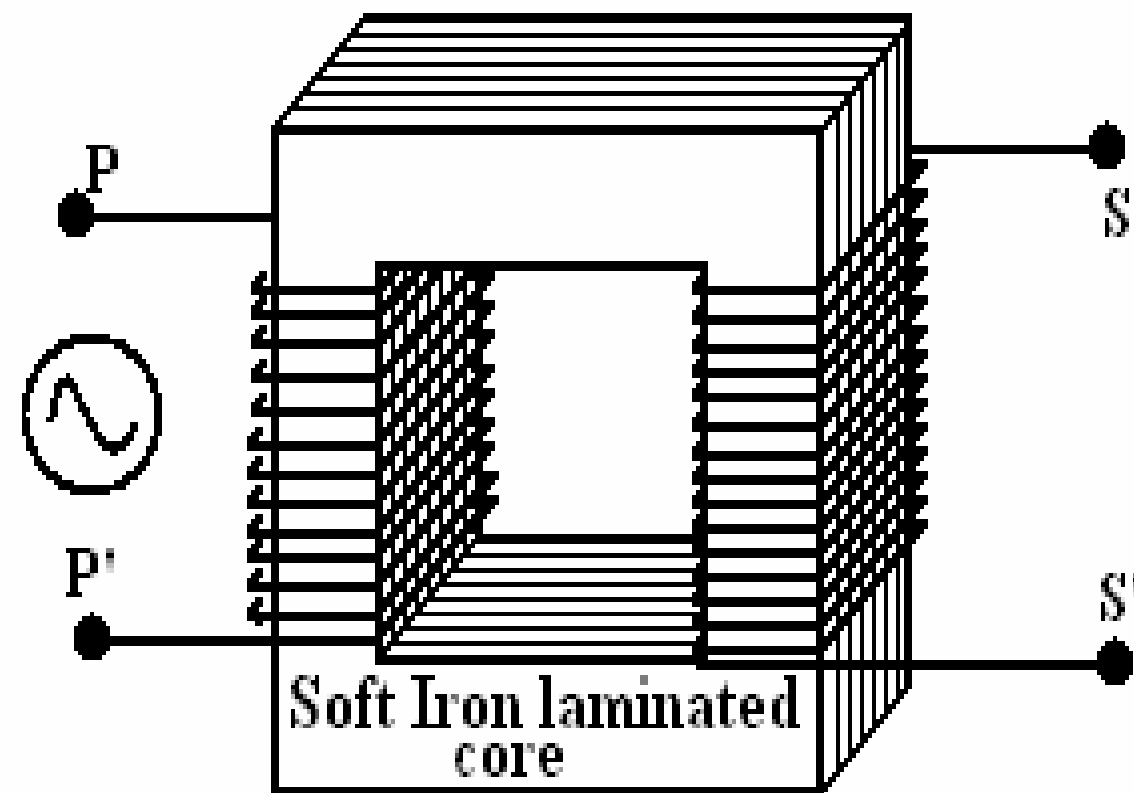


CONSTRUCTION



➤ Laminated sheets of steel are used to reduce eddy current loss. (I^2R Loss)

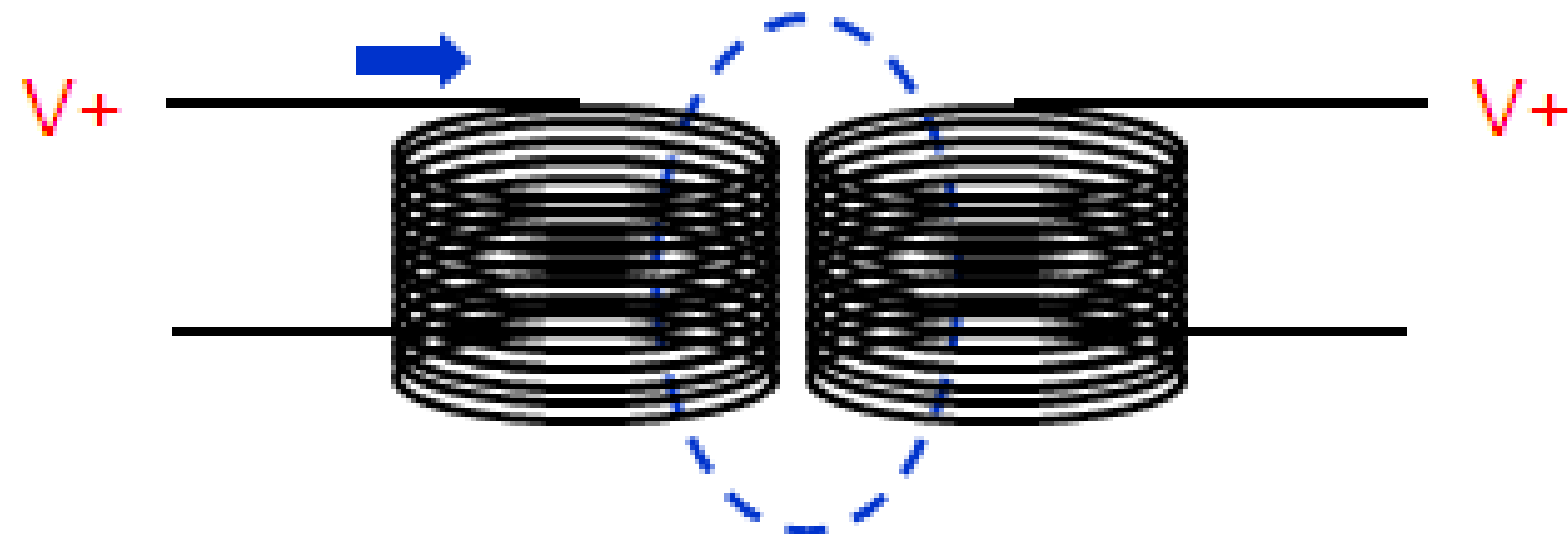
SINGLE PHASE TRANSFORMER



- Current in the primary coil changes being alternating in nature, a changing magnetic field is produced
- Changing magnetic field gets associated with the secondary through the soft iron core
- Magnetic flux linked with the secondary coil changes.
- Induces e.m.f. in the secondary.

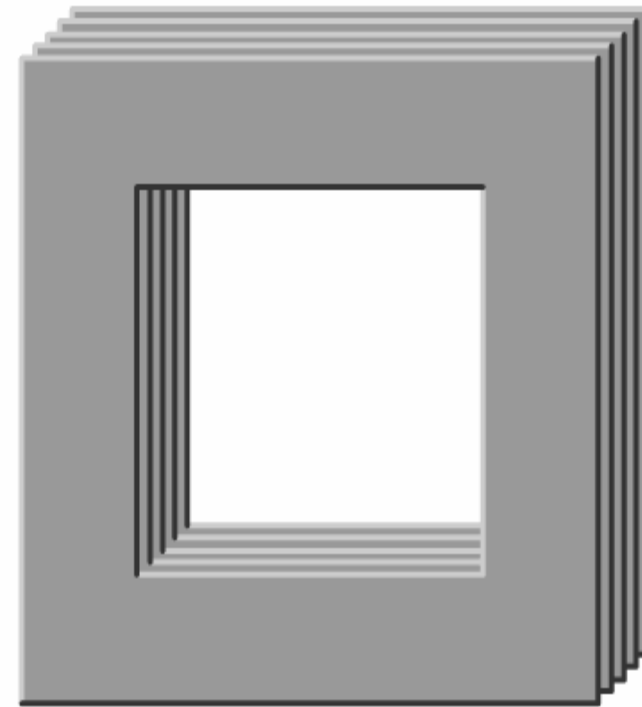
SINGLE PHASE TRANSFORMER

- Primary coil is supplied with a AC voltage.
- Current drawn produces a magnetic field
- Magnetic field transported to a secondary coil via a magnetic circuit
- Magnetic field induces a voltage in secondary coil



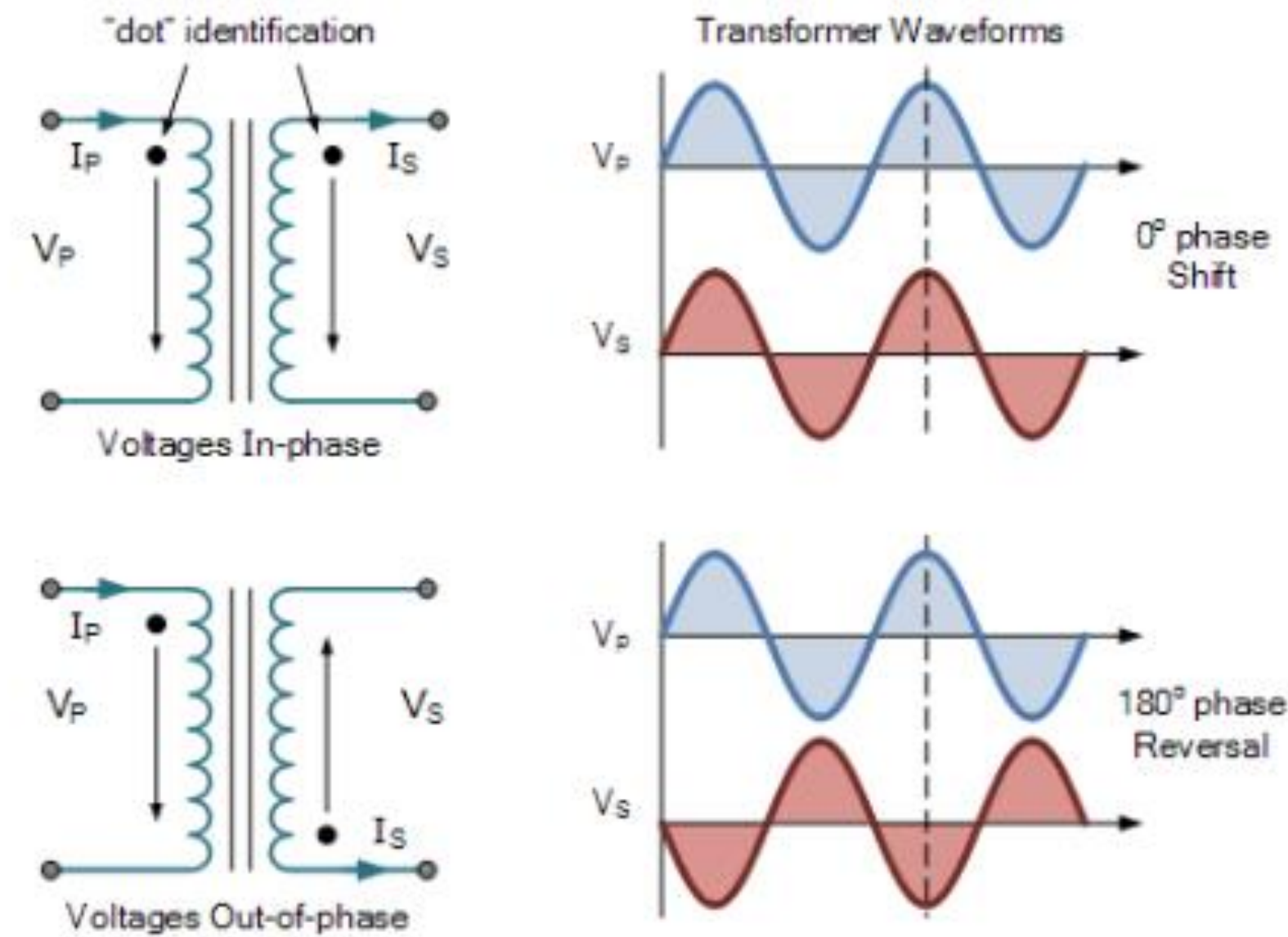


SINGLE PHASE TRANSFORMER



- **Working principle** of Transformer is based on Faraday's Law of Electromagnetic Induction.
- In a transformer, an alternating magnetic flux is generated in the core by the primary current. Alternating flux links with the secondary winding.
- Flux linkage in secondary is time variant, an emf is induced across the terminals of secondary winding.

CONSTRUCTION

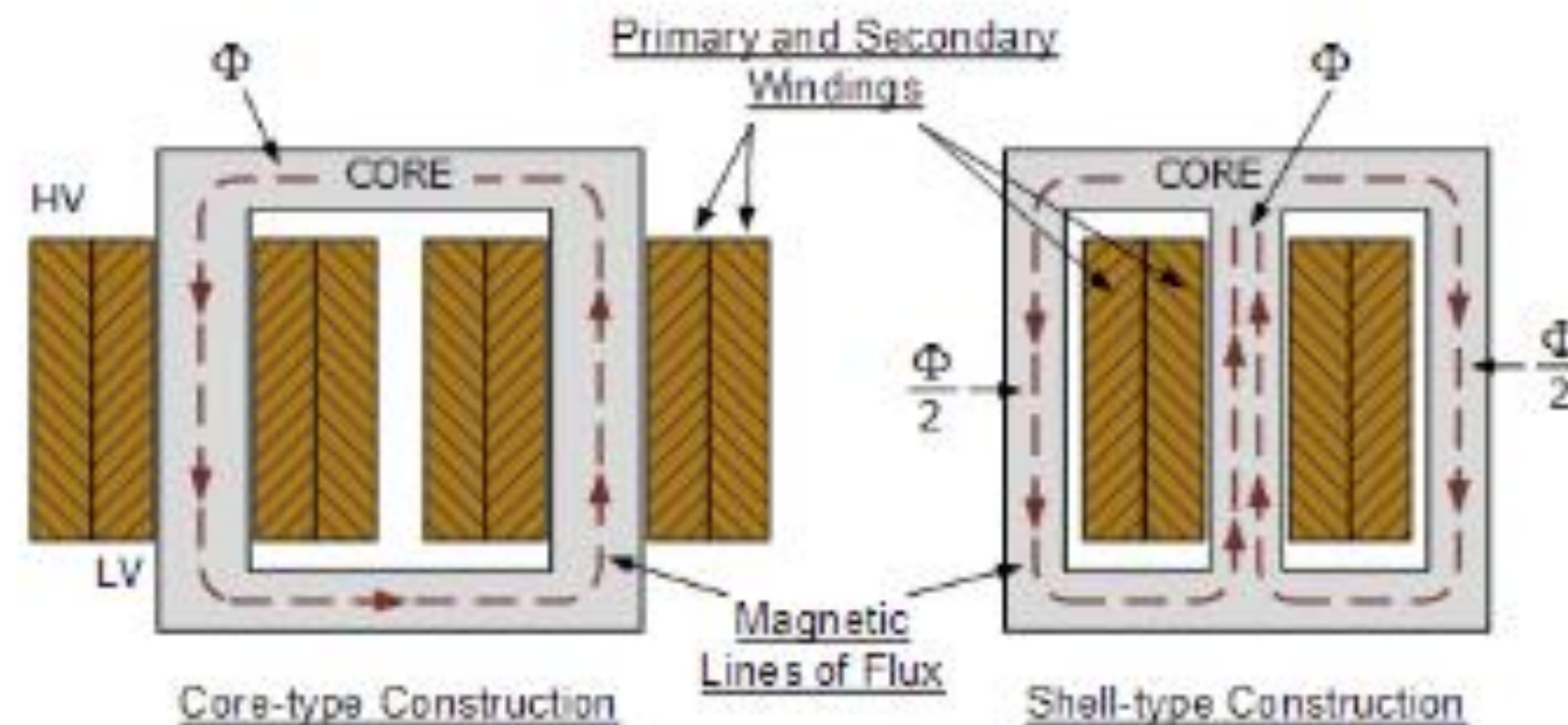


- In First Transformer the transformers primary and secondary coil windings are wound in Same directions represent by dot in same side
- In Second Transformer the transformers primary and secondary coil windings are wound in opposite directions represent by dot in opposite side

TYPES OF TRANSFORMER

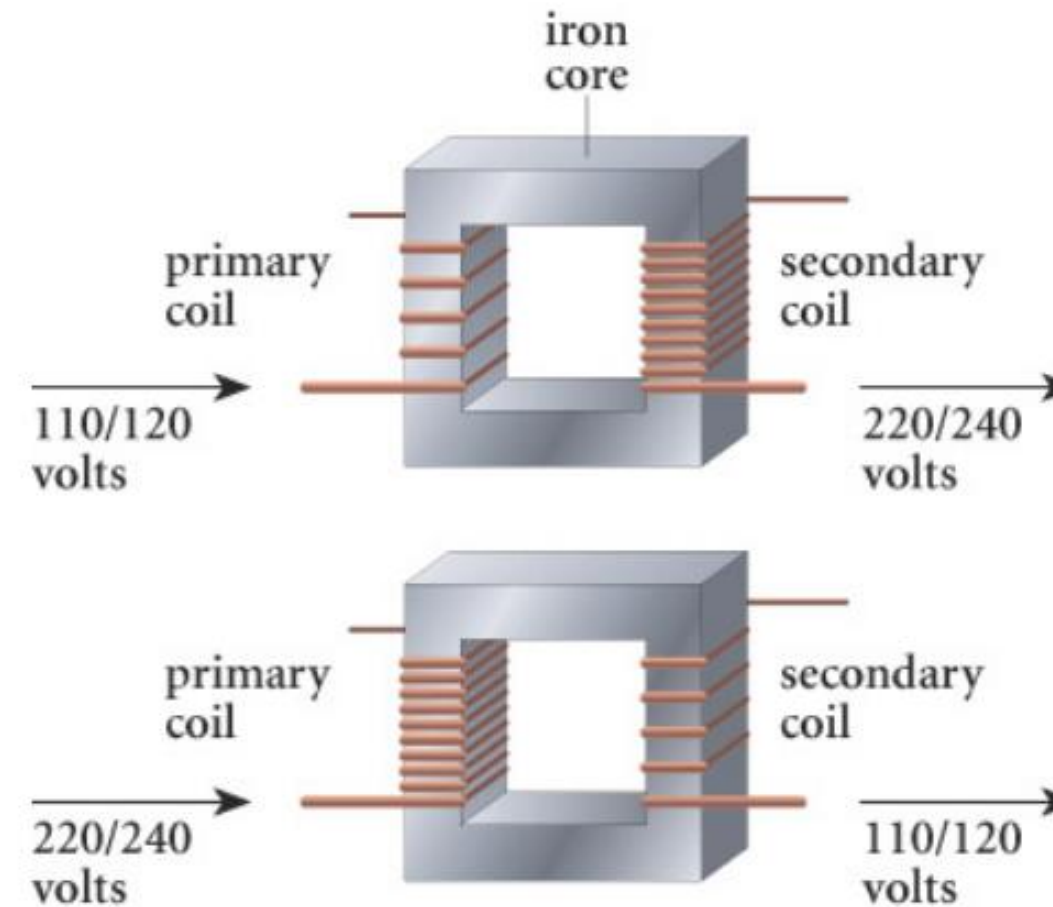
(A) On the basis of construction, transformers can be classified into two types as;

- Core type transformer and
- Shell type transformer





TYPES OF TRANSFORMER

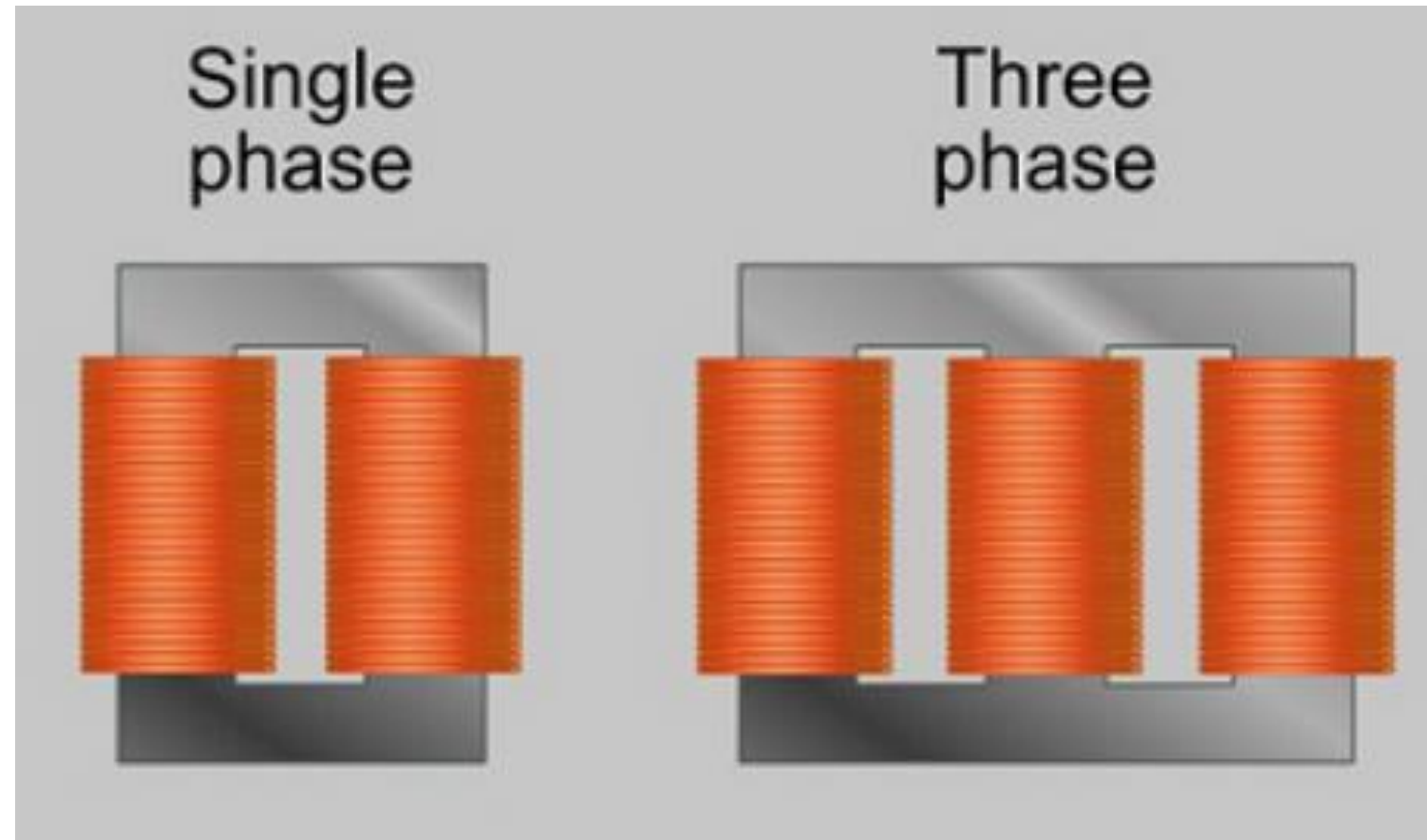


(B) On the basis of their purpose

Step up transformer: Voltage increases (with subsequent decrease in current) at secondary.

Step down transformer: Voltage decreases (with subsequent increase in current) at secondary.

TYPES OF TRANSFORMER



(C) On the basis of type of supply

- Single phase transformer
- Three phase transformer

TYPES OF TRANSFORMER

(D) On the basis of their use

Power transformer: Used in **transmission network** high rating

Distribution transformer: Used in **distribution network** comparatively lower rating than that of power transformers.

Instrument transformer: Used in relay and protection purpose in different instruments in industries.

- Current transformer (CT)
- Potential transformer (PT)

(E) On the basis of cooling employed

- Oil-filled water cooled type
- Oil-filled self cooled type
- Air blast type (air cooled)

TRANSFORMER

1-Which of the following is not a fitting on transformer?

- (A) Breather
- (B) Conservator
- (C) Buchholz Relay
- (D) Commutator

ANS-(D) COMMUTATOR

*Thank
You*