

# Lecture-35

## **Tutorial**

Lecture delivered by:



# Objectives

At the end of this lecture, student will be able to:

- Solve the problems on the transformer E.M.F. equation
- Solve the problems on the on-load phasor diagram
- Solve the problem on the equivalent circuit of a transformer



### Problem 1:

A single-phase, 50 Hz transformer has 25 primary turns and 300 secondary turns. The cross-sectional area of the core is 300 cm<sup>2</sup>. When the primary winding is connected to a 250V supply, determine the

- (a) maximum value of the flux density in the core and
- (b) voltage induced in the secondary winding.

### Problem 2:

A 4500 V/225 V, 50 Hz single-phase transformer is to have an approximate e.m.f. per turn of 15V and operate with a maximum flux of 1.4 T. Calculate the

- (a) number of primary and secondary turns and
- (b) cross-sectional area of the core.



### Problem 3:

A single-phase, 50 Hz transformer has 40 primary turns and 520 secondary turns. The cross-sectional area of the core is  $270 \text{ cm}^2$ . When the primary winding is connected to a 300 volt supply, determine the

- (a) maximum value of flux density in the core and
- (b) voltage induced in the secondary winding

### Problem 4:

A 3.3 kV/110 V, 50 Hz, single-phase transformer is to have an approximate e.m.f. per turn of 22V and operate with a maximum flux of 1.25 T. Calculate the

- (a) number of primary and secondary turns and
- (b) crosssectional area of the core



### Problem 5:

A single-phase transformer has 2000 turns on the primary and 800 turns on the secondary. Its no-load current is 5A at a power factor of 0.20 lagging. Assuming the volt drop in the windings is negligible, determine the primary current and power factor when the secondary current is 100A at a power factor of 0.85 lagging.

### Problem 6:

A single-phase transformer has 2400 turns on the primary and 600 turns on the secondary. Its no-load current is 4A at a power factor of 0.25 lagging. Assuming the volt drop in the windings is negligible, calculate the primary current and power factor when the secondary current is 80A at a power factor of 0.8 lagging.



### Problem 7:

A transformer has 600 primary turns and 150 secondary turns. The primary and secondary resistances are 0.25 and 0.01 ohms respectively and the corresponding leakage reactances are 1.0 and 0.04 ohms respectively. Determine the

- (a) equivalent resistance referred to the primary winding,
- (b) equivalent reactance referred to the primary winding
- (c) equivalent impedance referred to the primary winding and
- (d) phase angle of the impedance.



# Summary

- Understand and be able to use transformer E.M.F. equation
- Understand and be able to use on-load phasor diagram
- Understand and be able to use equivalent circuit of a transformer

