

## UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

Department of Electrical Engineering

## The Properties of a Power Transformer

INTRODUCTION

Essentially, a transformer consist of two or more windings of wire coupled by a mutual magnetic field. The magnitude and the amount of flux coupling the windings can be greatly enhanced if the core on which the windings are wound is made of a ferromagnetic material; which is what is done with a power transformer. Since the windings are coils of wire, since all of the flux produced in one winding does not linked the other windings, and since the ferromagnetic material making up the core and frame of the power transformer exhibits power losses due to hysteresis and eddy-current effects, it is expected that the equivalent circuit of the transformer would include resistances and inductances to account for these properties.

ASSIGNMENT

The student is to devise and run such tests as needed to obtain the properties and an equivalent circuit for a power transformer.

REFERENCES

1. References on reserve in the library.
2. Textbooks on electromagnetic devices, or, specifically, power transformers.
3. Faculty with expertise in the area of power transmission systems.

EXPECTED RESULTS (as a minimum)

1. A graph showing core loss in watts and exciting current in amperes versus applied voltage for 0-150 percent of the rated voltage of the transformer.
2. A graph showing core loss, d.c. copper loss, stray losses, and total losses in watts versus input current for 0-150 percent of rated current holding the applied voltage at rated value.
3. An equivalent circuit for the transformer.
4. Voltage regulation from no-load to full-load (rated) conditions at unity power factor, 80 percent lagging power factor, and 80 percent leading power factor.
5. A graph of efficiency versus current from 0-150 percent of rated current for unity power factor and 80 percent power factor.