THE ALTERNATING CURRENT TRANSFORMER

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PREFACE

The following pages originated from a course of University lectures. It is hoped that the book will be of use to the engineer and general reader. Some knowledge of elementary alternating currents is presupposed.

I have found that the student who grasps the theory of the transformer has little difficulty with the more complicated actions and reactions taking place in the induction motor, and is also helped in his study of synchronous apparatus.

Chapters I and II are merely introductory. Chapters III to V, carefully studied, should give the reader a thorough knowledge of the transformer. The tests in Chapter VI should be carried out by the student on a few commercial types. The method of design in Chapter VII is offered as a probable improvement over that usually given in text books.

I wish to thank the manufacturers for the loan of cuts used in Chapter X.

Thanks are also due the publishers who have maintained their reputation for sparing no effort or expense to make the book mechanically as perfect as possible. I am indebted to Mr. A. S. Kalenborn for reading proofs.

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CONTENTS.

NOTATION.

i=instantaneous value of the current,
I=maximum value of the current,
n=instantaneous value of the magnetic flux,
N=maximum value of the magnetic flux,
h=instantaneous value of the strength of field,
H=maximum value of the strength of field,
S=number of turns,
a=ratio of transformation=$\frac{S_1}{S_2}$,
L=coefficient of self-induction,
M=coefficient of mutual induction,
l=length of magnetic circuit,
A=cross section of iron under induction,
e=instantaneous value of e.m.f.,
E=maximum value of e.m.f. or effective e.m.f.,
ω=two π times the frequency,
f=frequency,
R_1=primary internal resistance,
r_2=secondary internal resistance,
R_2=resistance of load,
E_2=e.m.f. applied to load,
E_1=primary induced e.m.f.,
$\frac{E_1}{a}$=secondary induct e.m.f.,

NOTE.—Subscripts $_1$ and $_2$ refer to primary and secondary coil respectively.