DESIGN AND CONSTRUCTION OF TRANSFOMER TRAINNER

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INTRODUCTION

- The transformer circuit trainer is an educational tool designed to help students understand the working principles of single-phase transformers through hands-on learning. It includes essential transformer setups with measurement tools like voltmeters, ammeters, and circuit breakers. The trainer bridges the gap between theory and practical application, allowing students to conduct experiments, analyze transformer behavior, and apply

PROBLEM STATEMENT

- In many institutions, students lack practical exposure to transformers due to insufficient lab equipment. This results in poor understanding and inadequate preparation for fieldwork. Commercial kits are often expensive and unsuitable for introductory levels. This project solves this by designing a simple, low-cost, and easy-to-use trainer that demonstrates basic transformer operations safely and effectively.

AIM AND OBJECTIVES

- Aim:
- To design and construct a transformer circuit trainer for educational use.

- Objectives:
- - To develop a trainer demonstrating step-up, step-down, and isolation modes.
- - To include safety features like fuses and breakers.
- - To integrate meters for voltage and current measurement.
- - To support repeated experiments.
- - To ensure safe operation in classroom

SCOPE OF STUDY

- This project involves designing and constructing a single-phase transformer circuit trainer. It includes step-up and step-down transformers, fuses, circuit breakers, voltmeters, ammeters, and socket terminals. It operates on standard 220V AC and is intended for classroom and lab demonstrations only.

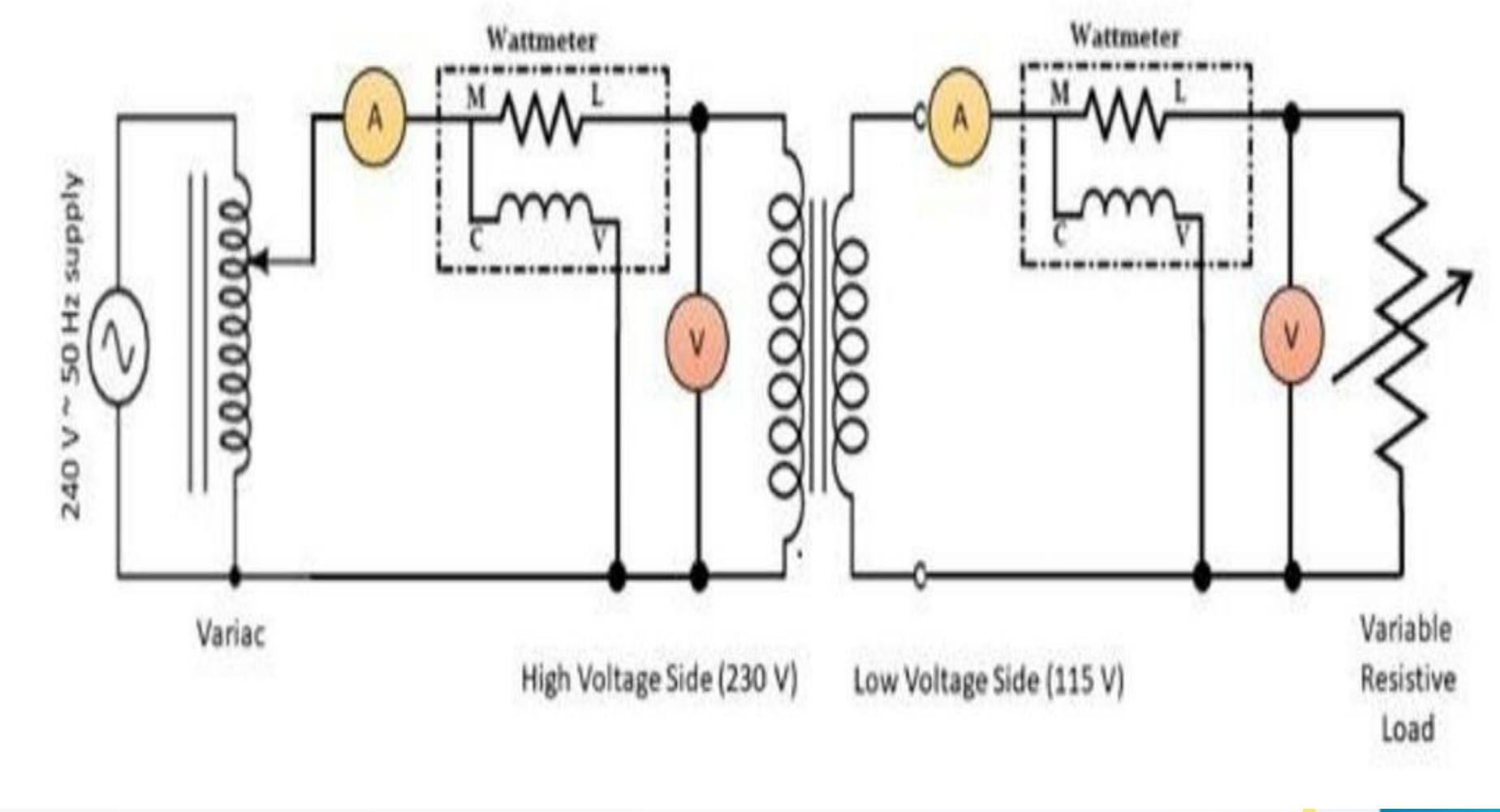
LITERATURE REVIEW

- The concept of transformers began with Faraday’s laws and evolved with Stanley's practical applications. Various teaching methods like lectures and simulations exist, but they often lack tactile learning. Trainer kits help overcome this by offering hands-on interaction. This project builds on those ideas to create a simple, affordable, and practical trainer for students.

METHODOLOGY (CIRCUIT DIAGRAM)

- The process included planning, design, component selection, assembly, and testing. Key components are
- 1. single-phase transformer ;230v/50hz
- 2. fuses ; protect the transformer from damage
- 3. circuit breakers; prevent over current or short circuit damage
- 4. voltmeters ;measure primary and secondary voltage across winding of the transformer
- 5. ammeters ; measures input and output currents : all arranged in a clear and safe layout for training purposes.

CIRCUIT DIAGRAM OF TRANSFORMER EFFICIENCY



RESULT AND DISCUSSION

- The completed trainer demonstrated transformer principles accurately. Voltage readings aligned with expectations. The circuit breaker tripped during overload tests, confirming safety features worked. The device performed step-up and step-down operations reliably.

OBSERVATION RESULT
Experiment 1

Observation Table

Load (%)	V1(V)	I1(A)	Pin(W)	V2(V)	12(A)	Pout(W)	Efficiency (%)
25(50Ω)	50	1.2	60	40	0.8	32	53.3
50(50/100 Ω)	50	1.4	70	40	1.2	48	68.5
75(50/100/200 Ω)	50	1.8	90	38	1.4	53.2	59.1
100(50/100/200/500 Ω)	50	1.9	95	38	1.5	57	60

OBSERVATION (transformer) Experiment 2

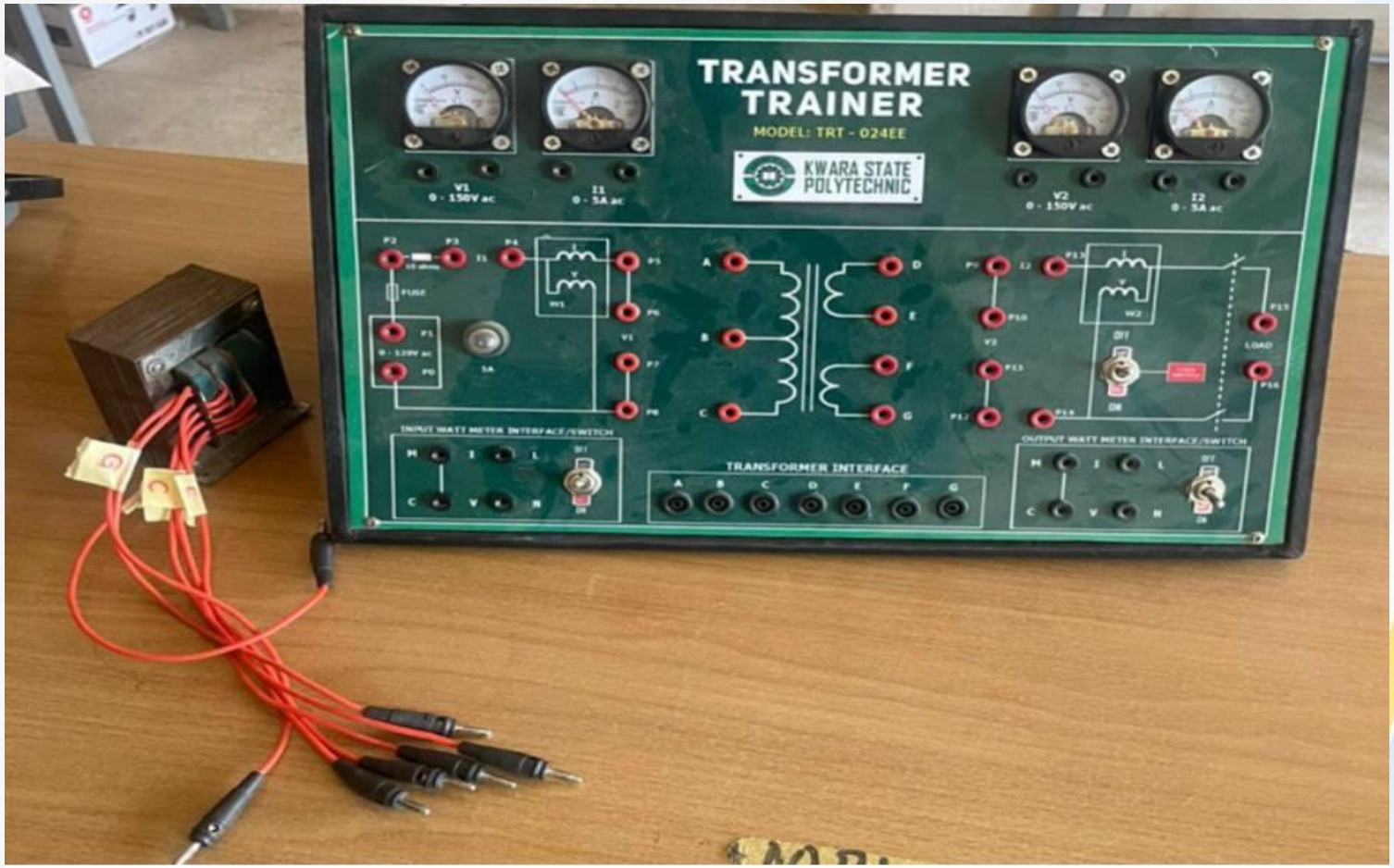
Observation Table

S/N	INPUTS (V1)	OUTPUTS (V2)	K(experimental)	K(theoretical)	REMARKS
1	AB = 50V	DE = 50	1 : 1	1 : 1	Isolation
2	AB = 50V	FG = 50	1 : 1	1 : 1	Isolation
3	AB = 50V	(E//F) DG = 100	2 : 1	2 : 1	Step up
4	BC = 50V	(E//F) DG = 100	2 : 1	2 : 1	Step up
5	BC = 50V	DE = 50	1 : 1	1 : 1	Isolation
6	BC = 50V	FG = 50	1 : 1	1 : 1	Isolation
7	AC = 50V	DE = 25	1 : 2	1 : 2	Step down
8	AC = 50V	FG = 25	1 : 2	1 : 2	Step down
9	AC = 50V	(E//F) DG = 50	1 : 1	1 : 1	Isolation
10	AC = 50V	(D//G) EF = 50	1 : 1	1 : 1	Isolation

Note:

the remarks should state if it is a step up or step down or isolation transformer

CONSTRUCTED SINGLE PHASE TRANSFORMER TRAINER



CONCLUSION AND RECOMMENDATION

- The transformer circuit trainer achieved its educational purpose. It is safe, easy to use, and effectively demonstrates transformer behavior. Future improvements could include digital displays, modular setups, and support for three-phase configurations.

REFERENCES

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