TECHNOLOGICAL UNIVERSITY (MAUBIN)

DEPARTMENT OF ELECTRICAL POWER ENGINEERING

STEP-UP TRANSFORMER

BY

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Aim and Objective

Undesirable effects may occur in the power system. In many applications such as electric generation, power transfer and loading, the transformers are used. The 'Step- Up Transformer' raises the load voltage while the supply voltage is drawn. So the primary objective of the use of this transformer is to maintain a very high level of reliable and continuous power supply to consumers, and to minimize the outage times.

Equipment Required

To construct a Step- Up Transformer, the following equipments are required:

1. Winding Machine

   It is used to wound the coils in the winding.

2. Multimeter

   It is used to choice the connections and polarity of the voltage and so on.

3. Hammer

   It is used to hit in the joining of E core and I core and so on.

4. Pliers
5. Cutter
6. Long nose

Material Required

In this project, the required materials are as following.

1. E I core
2. Standard Wire Gauge
3. Switch (on/off)
4. Selector Switch
5. Sockets (110V & 220V)
6. Tupin
7. Insulating Paper
8. Fuse
9. Varnish
10. Voltmeter

11. Pilot Lamp
12. Body House
13. Varnish

Datas and Calculations of the Project

T/V = 7/A (or) 8/A (or) 9/A (a) 10/A (or) 11/A (or) 12/A (or) 13/A

If the core is best, the formula 7/A (or) 8/A can be used.

If the core is worst, the formula 12/A (or) 13/A can be used.

Where, A is the cross- sectional area of the core.

Now we use the formula 8/A because our core is good.

8/A = 8/4 = 2 turn per volt

Step (1) 230V = 460 turns

Step (2) 210V = 420 turns

Step (3) 190V = 380 turns

Step (4) 170V = 340 turns

Step (5) 150V = 300 turns

Step (6) 130V = 260 turns

Step (7) 110V = 220 turns

Step (8) 90V = 180 turns

Choosing the Standard Wire Gauge

$$P = V_2 I_2 = V_1 I_1$$

Secondary current $I_2 = \frac{\mathbf{Pout}}{\mathbf{V2}} = \frac{\mathbf{500W}}{\mathbf{230}}$ =2.13 Amp

Primary current $I_1 = \frac{\mathbf{Pin}}{\mathbf{V_1}} = \frac{\mathbf{500W}}{\mathbf{110}}$ =4.54 Amp

(Assume: Losses are negligible)

Calculation to obtain Core Size

Our transformer is 500 W step- up transformer. We use E I core and core type winding.

$$\therefore \text{E-core Area, } A = \frac{\sqrt{\text{Watt}}}{5.58}$$

$$\therefore A = \frac{\sqrt{500}}{5.58}$$

$$= 4 \text{ in}^2 = 2 \times 2$$

where the unit of area is inches square.

Core Area = a × b

$\therefore$ a = 2 in , B = 2 in

$\therefore$former size = 2 × 2 in^2