Ministry of high Education and Scientific Research
Middle Technical University
Electrical Engineering Technical College

Training package
in

Workshops
(Transformers)

For

Students of first class
Department of Medical Instrumentation Techniques Engineering

By

Huda Farooq Jameel Baban
Assistant lecturer
Dep. Medical Instrumentation Eng. Tech.
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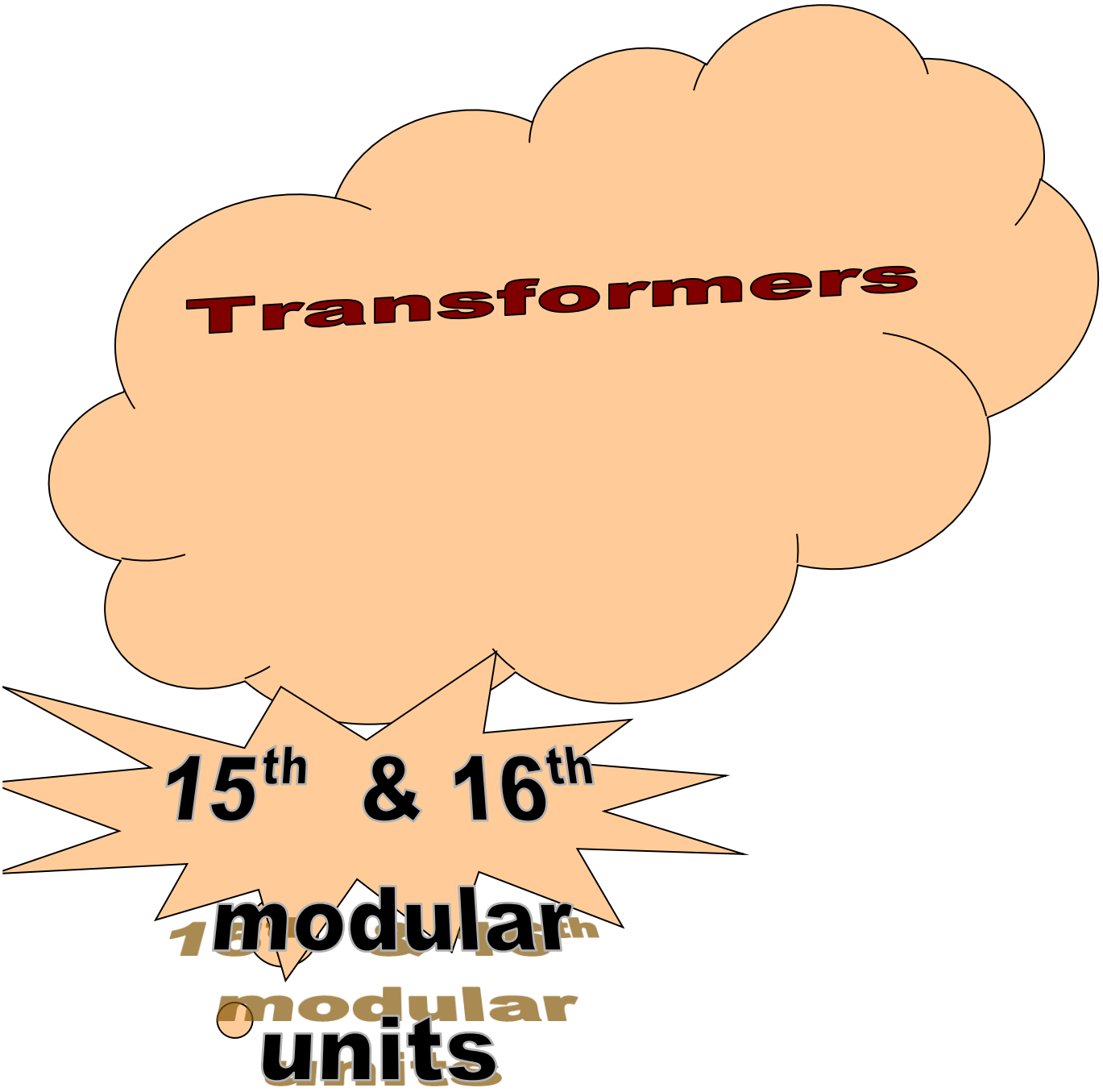

Transformers
15th & 16th
modular
units

1/ Overview

1 / A –Target population :-

For students of first class

Department of Medical Instrumentation Eng. Techniques

1 / B –Rationale :-

This unit introduces principles of Transformers in the workshop

1 / C –Central Idea :-

The major topics discussed in this unit are included in the following outline.

- **Using the transformers**
- **Testing the transformers**

2/ Performance Objectives :-

After studying the first modular unit, the student will be able to-

1. Using the transformers
2. Testing the transformers

3/ Pre test :-

Circle the correct answer:-

1. Used to transform the input voltage to one or more output voltages that can be higher or lower

a- transformer

b- voltage regulator

c- DC motor

d- all above

2. It has a higher voltage at its output than at its input

a- Step up transformer b- Step up transformer

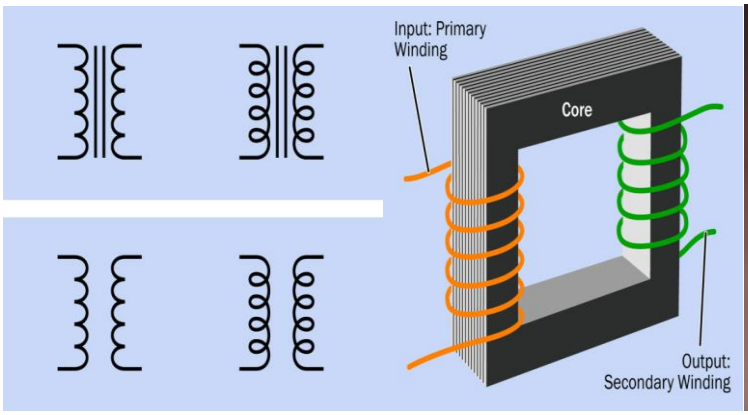
c- All above

4/ the text :-

➢ Transformers

1- AC-AC transformer

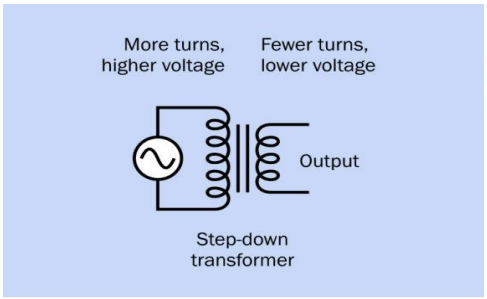
A transformer requires an input of alternating current (AC). It transforms the input voltage to one or more output voltages that can be higher or lower. Transformers range in size from tiny impedance matching units in audio equipment such as microphones, to multi-ton behemoths that supply high voltage through the national power grids. Almost all-electronic equipment that is designed to be powered by municipal AC in homes or businesses requires the inclusion of a transformer.

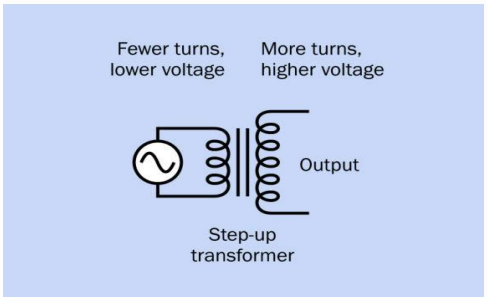


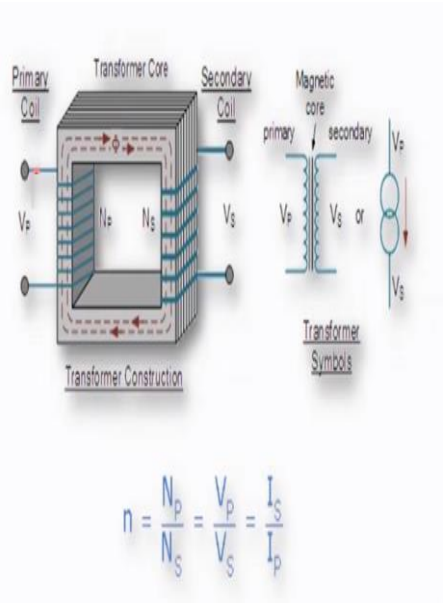
- Types of transformer

A- Step an up transformer: has a higher voltage at its output than at its input ,

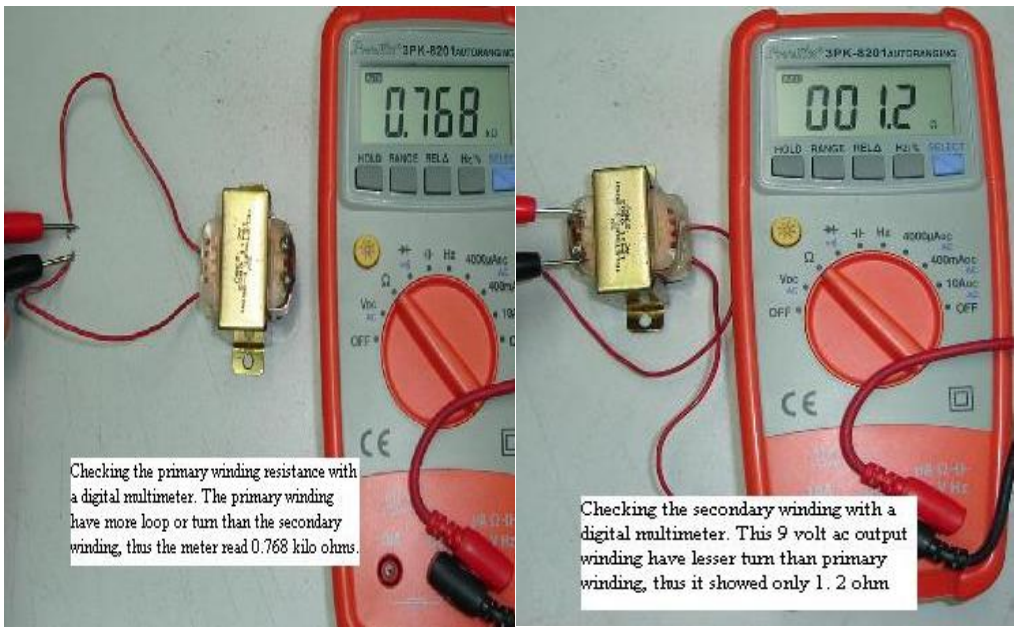
B- Step-down transformer: has a higher voltage at its input than at its output. See Figure below







Testing the transformer



2 -AC-DC power supply

An AC-DC power supply converts alternating current (AC) into the direct current (DC) that most electronic devices require, usually at a lower voltage. Thus, despite its name, a power supply actually requires an external supply of power to operate. Larger products, such as computers or stereo equipment, generally have a power supply contained within the device, enabling it to plug directly into a wall outlet. Smaller battery-powered devices, such as cellular phones or media players, generally use an external power supply in the form of a small plastic pod or box that plugs into a wall outlet and delivers DC via a wire terminating in a

miniature connector. The external type of power supply is often, but not always, referred to as an AC adapter.

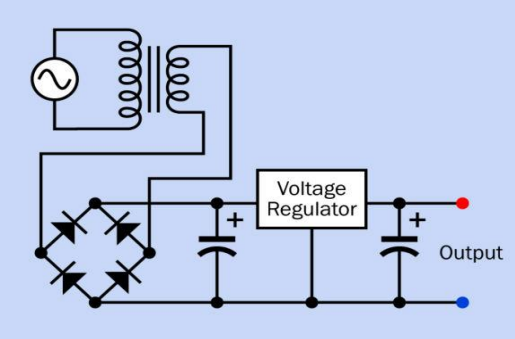
Linear Regulated Power Supply :

A linear regulated power supply converts AC to DC in three stages:

1 .A power transformer reduces the AC input to lower-voltage AC.

2 .A rectifier converts the AC to unsmoothed DC.

3. A voltage regulator, in conjunction with one or more capacitors, controls the DC voltage, smooths it, and removes transients. The regulator is properly known as a linear voltage regulator because it contains one or more transistors, which are functioning in linear mode—that is, responding linearly to fluctuations in base current, at less than their saturation level. The linear voltage regulator gives the linear regulated power supply its name. A simplified schematic of a linear regulated power supply is shown in Figure below.

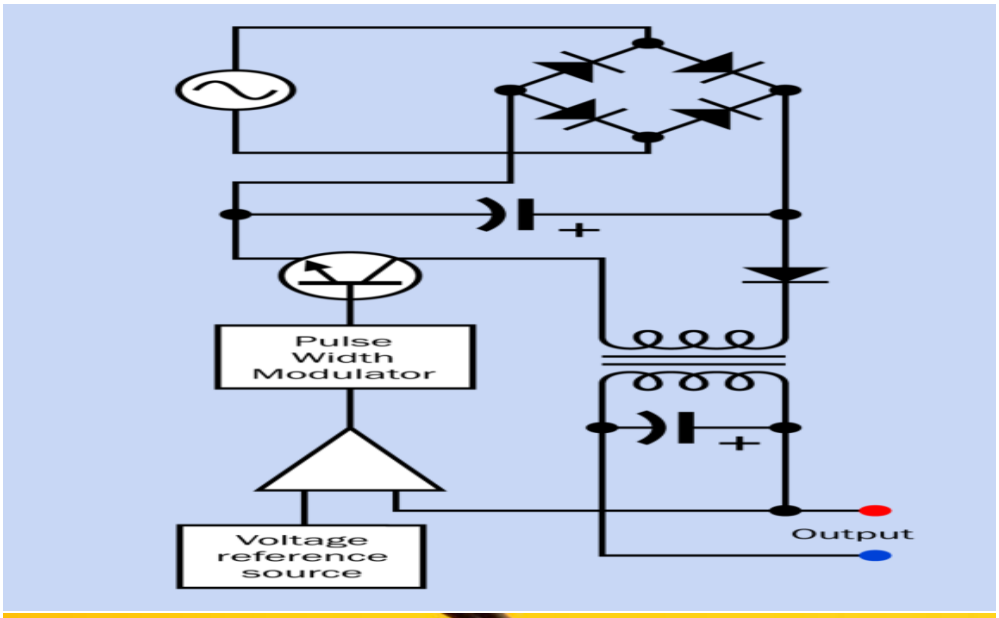


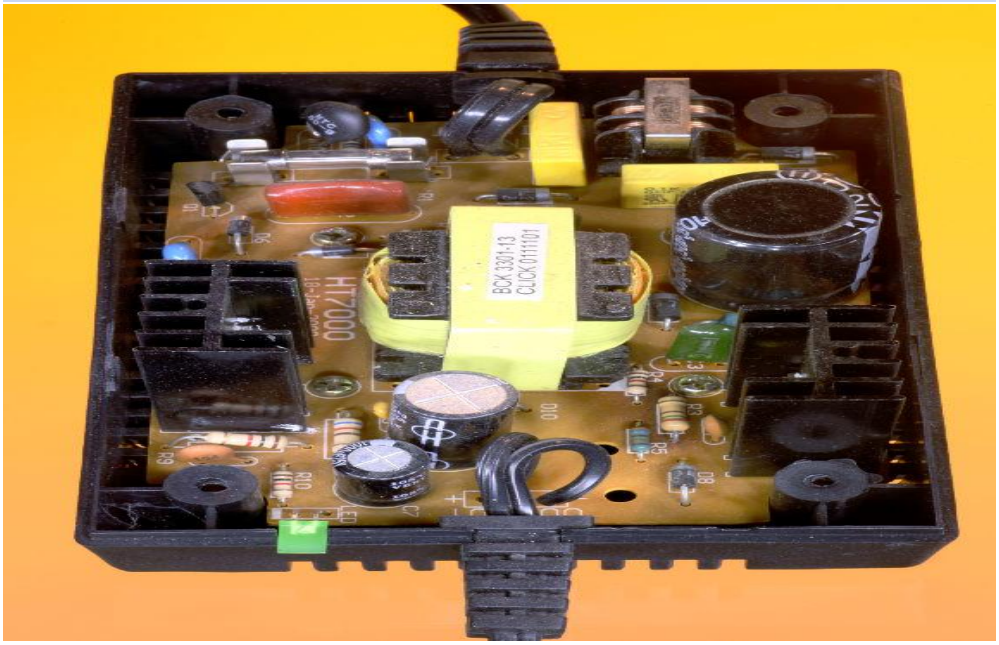
3- Switching Power Supply

Also known as a switched-mode power supply, an SMPS, or switcher, it converts AC to DC in two stages.

1 .A rectifier changes the AC input to unsmoothed DC, without a power transformer.

2. A DC-DC converter switches the DC on and off at a very high frequency using pulse width modulation to reduce its average effective voltage. Often the converter will be the flyback type, containing a transformer, but the high-frequency switching allows the transformer to be much smaller than the power transformer required in a linear regulated power supply.


Pulse
Width
Modulator
Voltage
reference
source
Output


HT7000

5/ Post test :-

Circle the correct answer:-

1- Converts alternating current (AC) into the direct current (DC) that most electronic devices require, usually at a lower voltage.

a- AC-DC power supply
b- DC-DC transformer
c- AC-DC transformer
d- all above

2- The transformer has two types:

a- True.
b- False.

3- The types of transformer are

a- Step-up
b- Step-down
c- a and b
d- not all above

6/ key answer :-

1- Pre test :-

1. **a**
2. **a**

2- Post test :-

1. **a**
2. **a**
3. **c**

7/References :-

1. Encyclopedia of Electronic Components Volume 1 (Charles Platt).
2. https://www.electricaltechnology.org/2013/03/how-to-remember-direction-of-pnp-and.html