



Basic Ham Radio Licensing Course

POWER SUPPLIES

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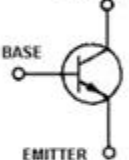
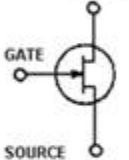

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LARC Ham-Radio Course

Active Devices & Power Supplies

COLLECTOR	DRAIN	PLATE
		
BASE	GATE	GRID
EMITTER	SOURCE	CATHODE
<u>BIPOLAR</u>	<u>JFET</u>	<u>VACUUM TUBE</u>

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Topics to be covered...

1. Last week: Active Devices: Diodes, Transistors and Tubes
2. This week: Power Supplies: Changing AC to DC

Types of Power Supplies

LINEAR

- Old Technology
- Easy to Understand
- Reliable
- Heavy!
- RF Quiet



SWITCHER

- New Technology
- Complex Circuit
- China CAPS!!
- Light Weight
- RF Noisy

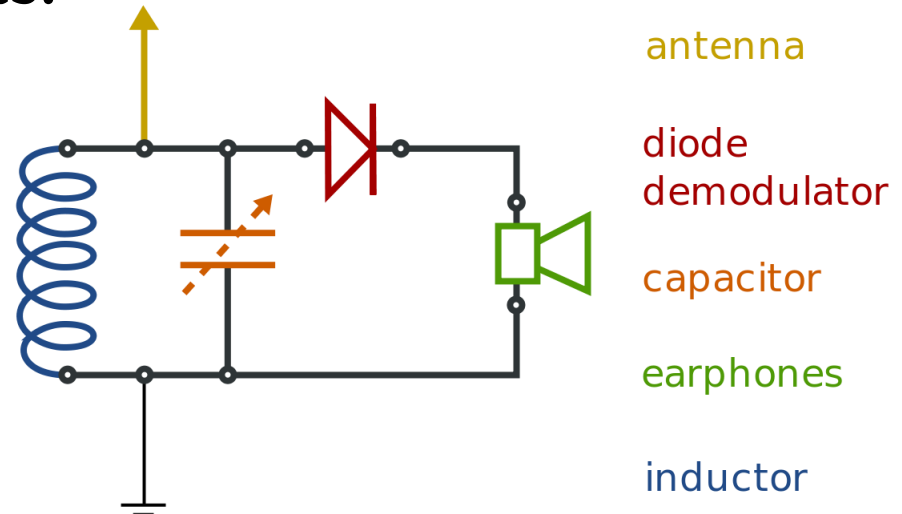


Review: Question 1 of 2

- B-004-002-002; One important application for diodes is recovering information from transmitted signals.

This is referred to as:

- a) Demodulation
- b) Regeneration
- c) Ionization
- d) Biasing



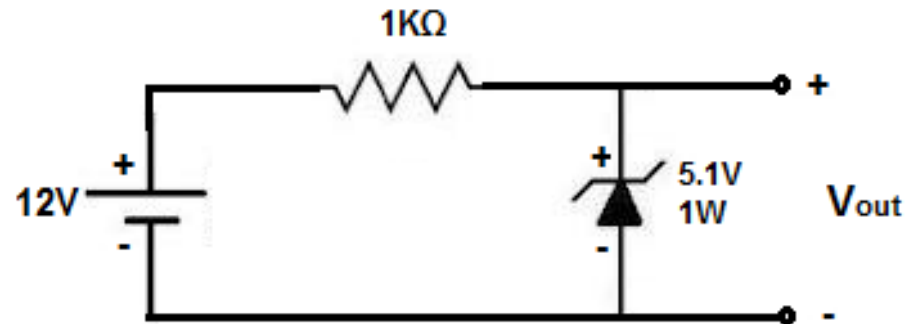
Early Crystal Radio



Review: Question 2 of 2

- B-004-002-001; Zener diodes are used as:
 - a) voltage regulators
 - b) current regulators
 - c) RF detectors
 - d) AF detectors

Zener Diode Voltage Regulator Circuit



PART2 - Objectives

- Power Supplies: Changing AC to DC
- Describe the components of a power supply and their functions
- Identify components of a power supply using block diagram

Why a power supply?

Household voltage = 120vac up to 15a

10w Transmitter = 13.8vdc, 3a

100w Transmitter = 13.8vdc, 20a

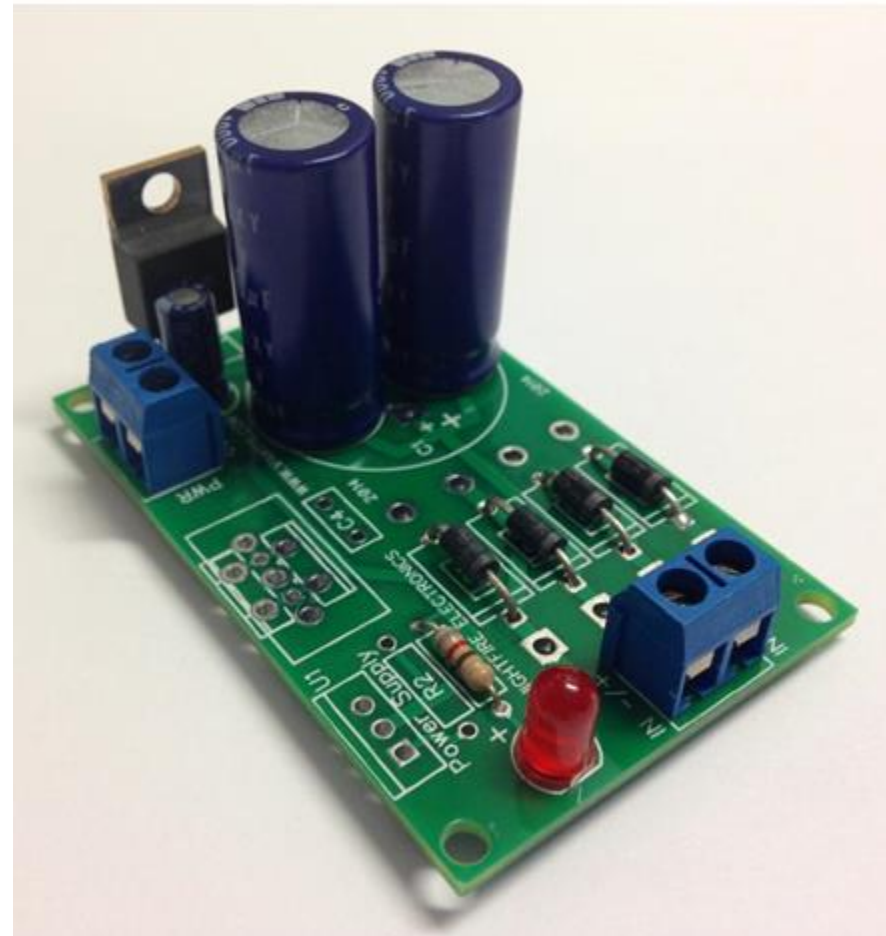
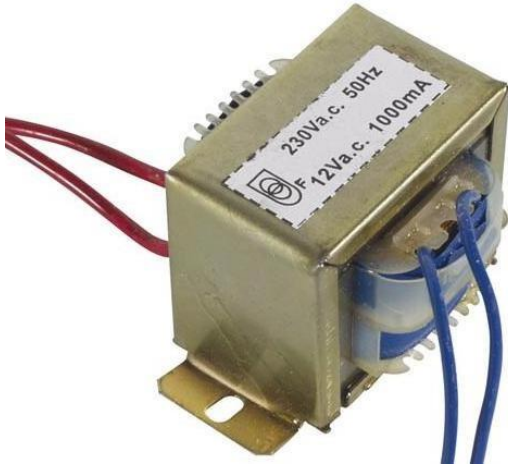
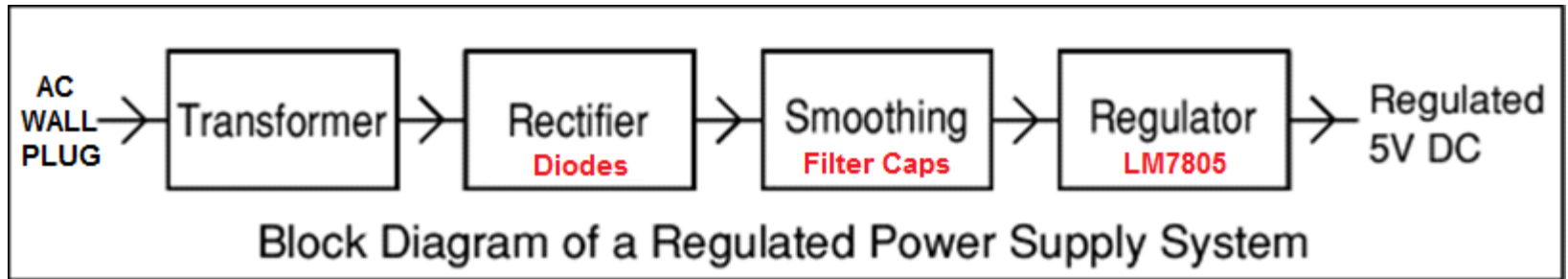
Issues...

1. Voltage must be raised or lowered
2. Voltage must be changed from AC to DC
3. Ripple must be filtered/smoothed
4. Constant/Steady = regulation

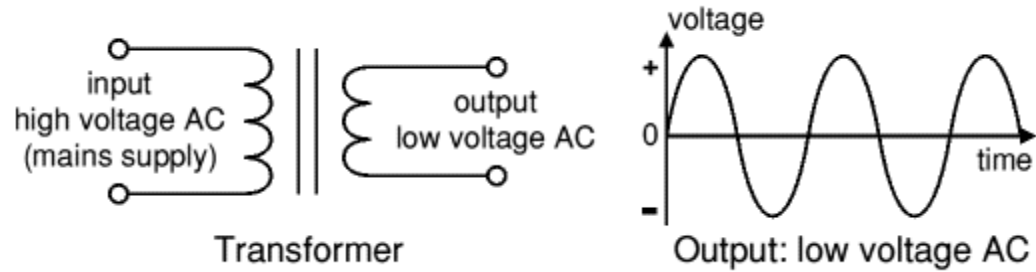
Factors...

- Input Voltage: Starting Point
- Output Voltage: Higher or lower?
- Rectification: AC to DC
- Filtering: getting rid of the bumps
- Output Current: The load
- Voltage Regulation: Steady within set limits

Block diagram - Overview



Transformer Only...



Exam Question

- B-005-011-001; If no load is attached to the secondary winding of a transformer, what is current in the primary winding called?
 - a) Magnetizing current
 - b) Direct current
 - c) Latent current
 - d) Stabilizing current

Exam Question

- B-005-011-004; In a mains power transformer, the primary winding has 250 turns, and the secondary has 500. If the input voltage is 120 volts, the likely secondary voltage is:
 - a) 240 V
 - b) 480 V
 - c) 610 V
 - d) 26 V

Exam Question

- B-005-011-008; A 100% efficient transformer has a turns ratio of 1/5. If the secondary current is 50 milliamperes, the primary current is:
 - a) 0.25 A
 - b) 2 500 mA
 - c) 0.01 A
 - d) 0.25 mA

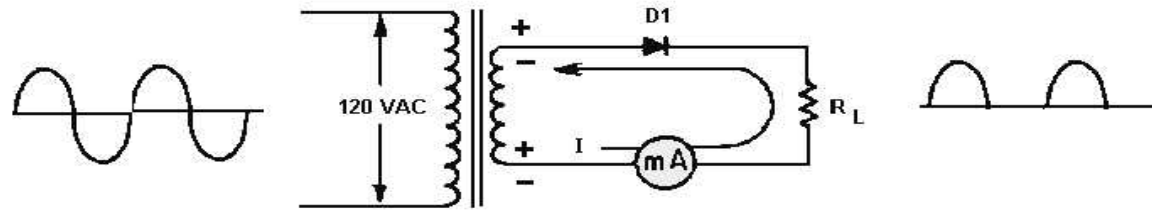
Exam Question

- B-005-011-003; A transformer has a 240 volt primary that draws a current of 250 milliamperes from the mains supply.
 - Assuming no losses and only one secondary, what current would be available from the 12 volt secondary?
-
- 5 amperes
 - 215 amperes
 - 25 amperes
 - 50 amperes

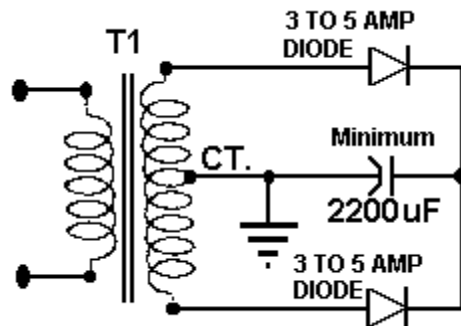
Exam Question

- B-005-011-002; A transformer operates a 6.3 volt 2 ampere light bulb from its secondary winding. The input power to the primary winding is approximately:
 - a) 13 watts
 - b) 6 watts
 - c) 8 watts
 - d) 3 watts

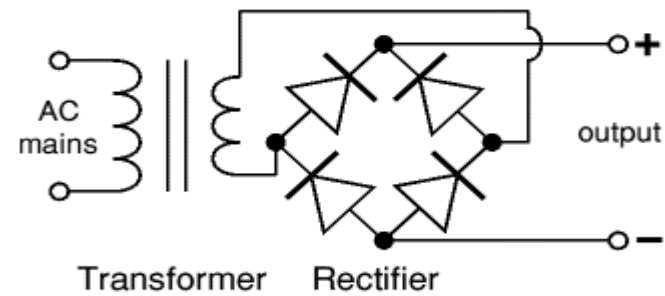
Rectification...



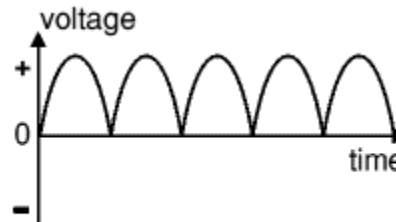
A. HALF-WAVE RECTIFIER



B. Full-wave Rectifier



C. Full-wave Rectifier

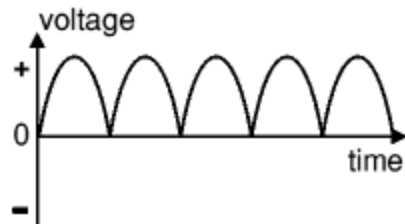
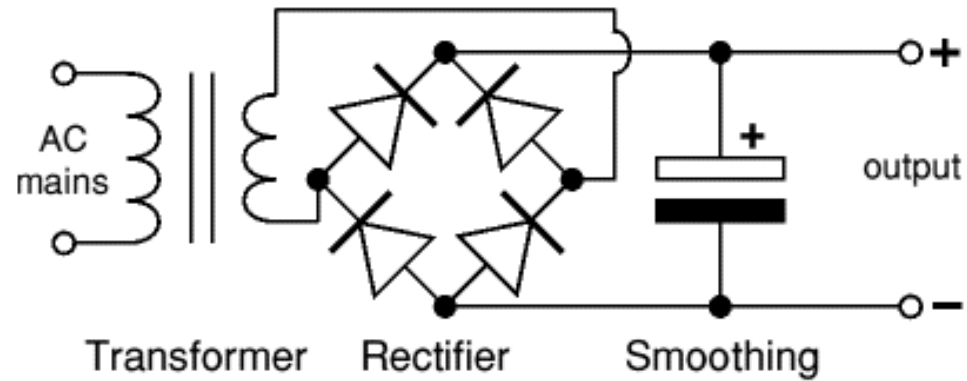


Output: varying DC

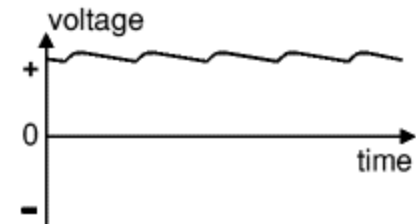
Exam Question...

- B-004-002-004; The action of changing alternating current to direct current is called:
 - a) Rectification
 - b) Amplification
 - c) Transformation
 - d) Modulation

Smoothing...



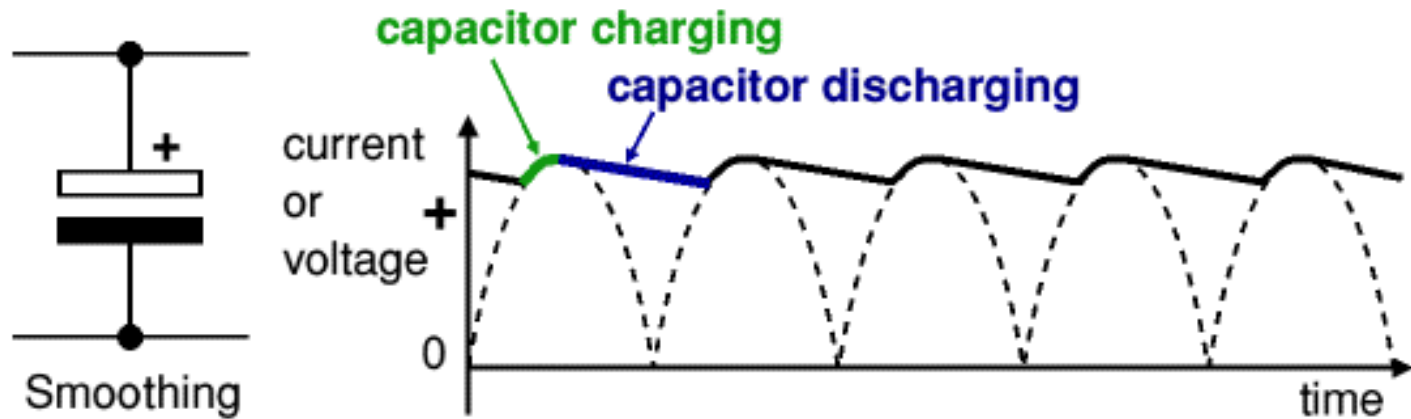
Input: Bumpy Pulsating DC



Output: smooth DC

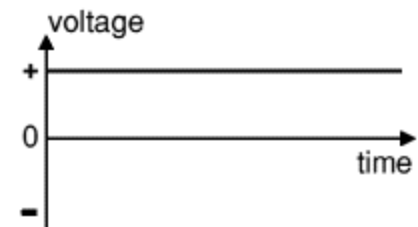
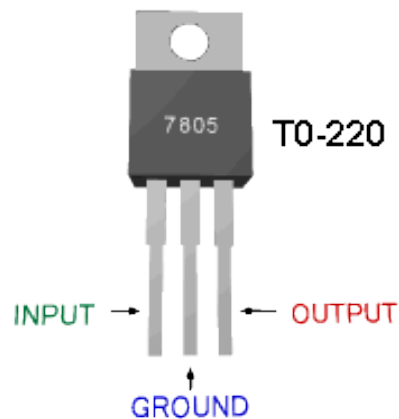
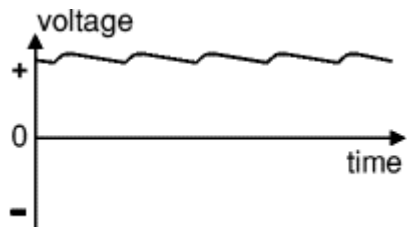
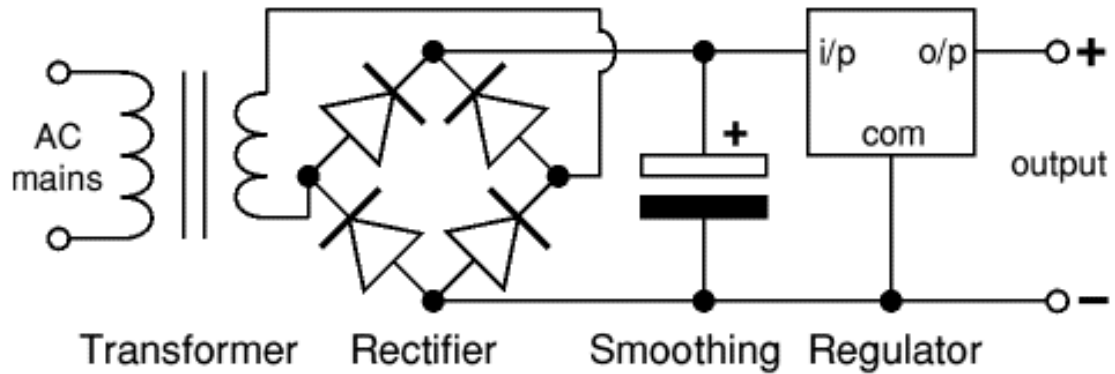
Smoothing PART 2

Capacitors as power sources...

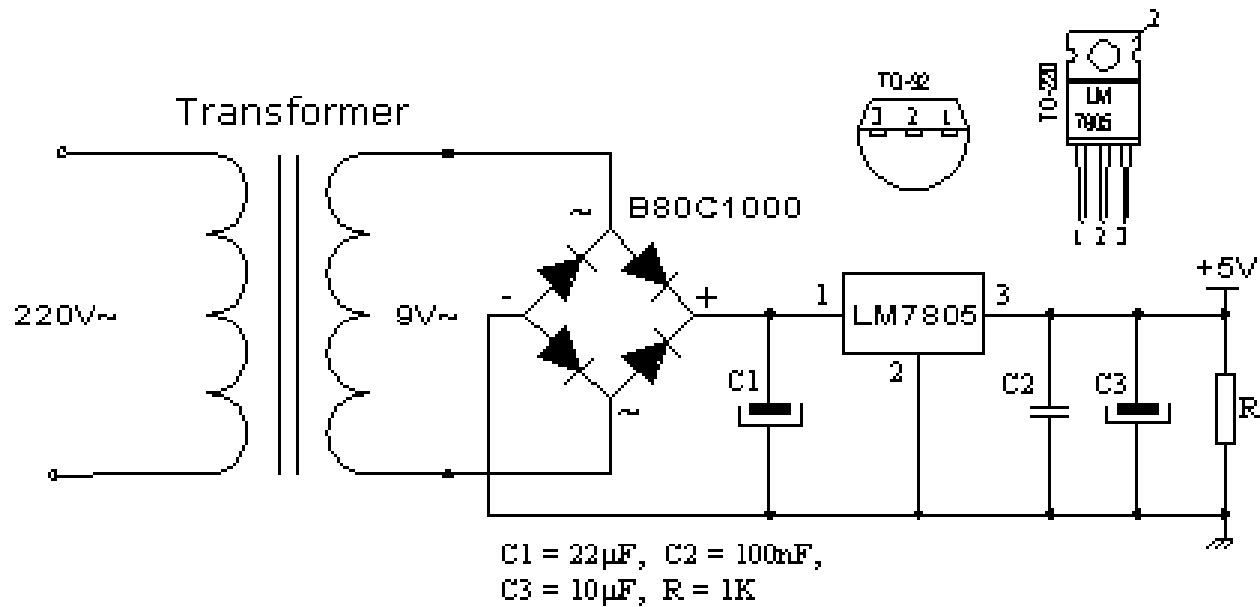


Rate of discharge depends on the load

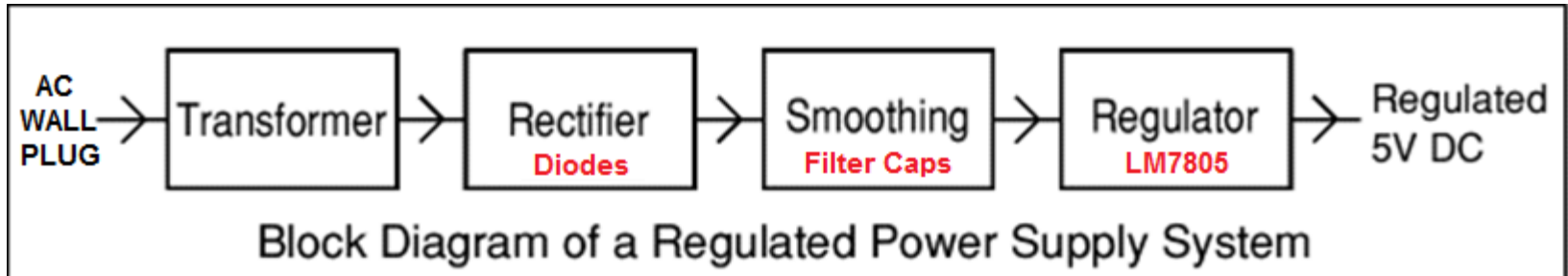
Regulation...



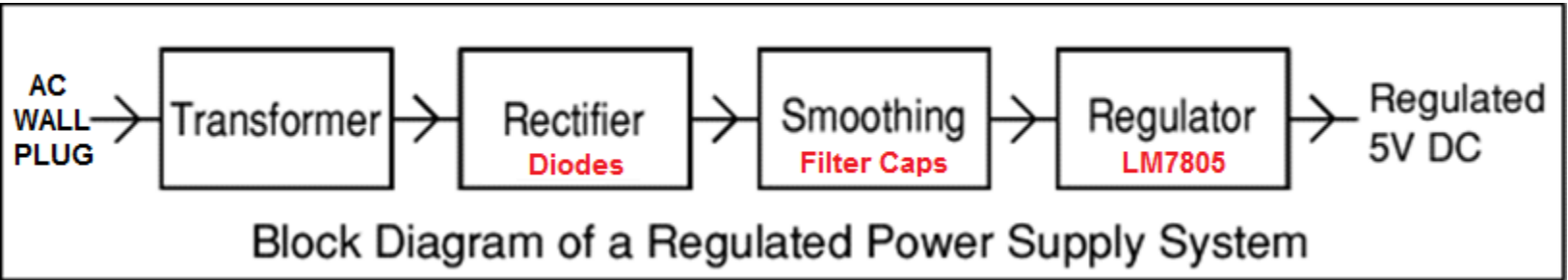
Schematic of a power supply



Power Supply Summary

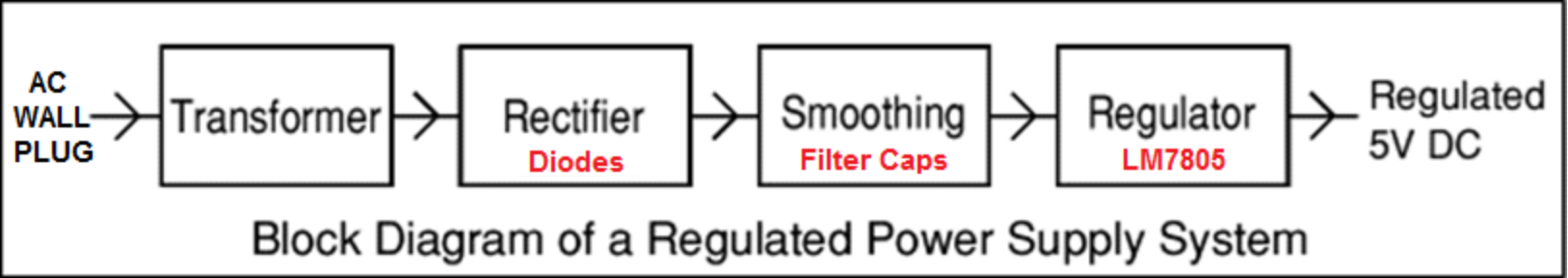


- **Transformer:** Drops high voltage AC to a lower voltage AC
- **Rectifier:** DIODES convert AC into pulsating DC
- **Smoothing:** Capacitor tries to filter the bumps
- **Regulator:** Smooth steady DC



- B-003-008-001; In a regulated power supply, the transformer connects to an external source which is referred to as _____.

- a) input
- b) regulator
- c) filter
- d) rectifier



- B-003-008-002; In a regulated power supply, the _____ is between the input and the rectifier.
 - a) transformer
 - b) output
 - c) regulator
 - d) filter

Exam Question

- B-003-008-003; In a regulated power supply, the _____ is between the transformer and the filter.
 - a) rectifier
 - b) input
 - c) output
 - d) regulator

Exam Question

- B-003-008-004; In a regulated power supply, the output of the rectifier is connected to the _____.
- filter
- output
- transformer
- regulator

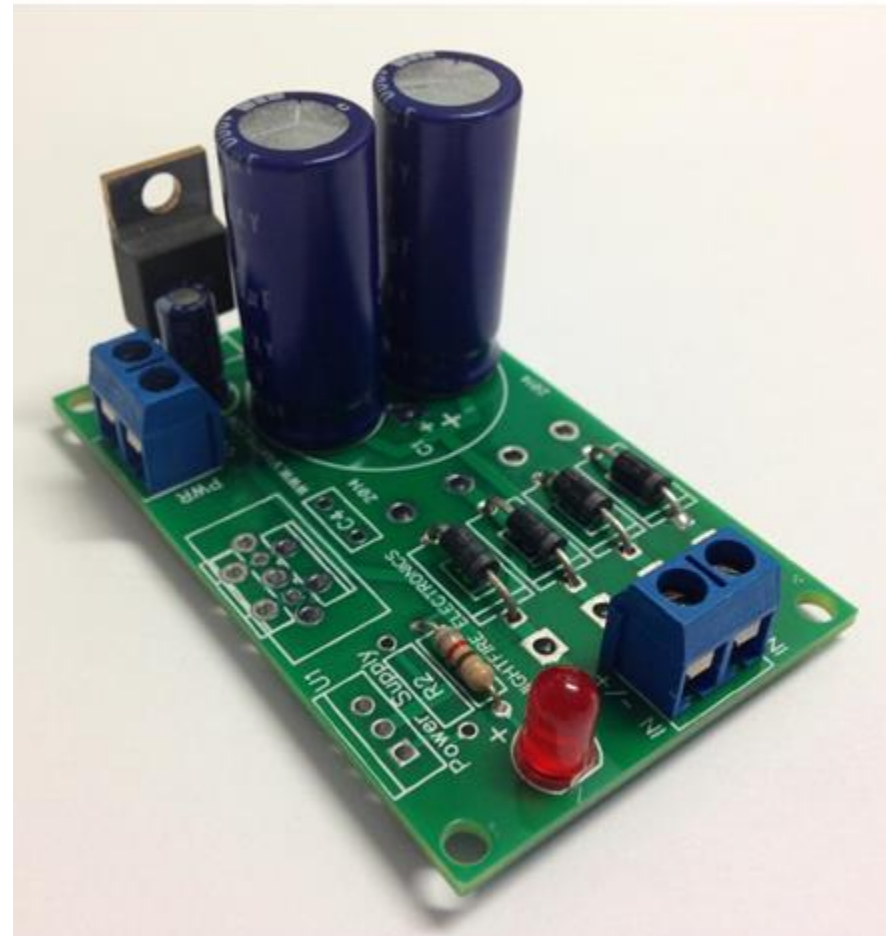
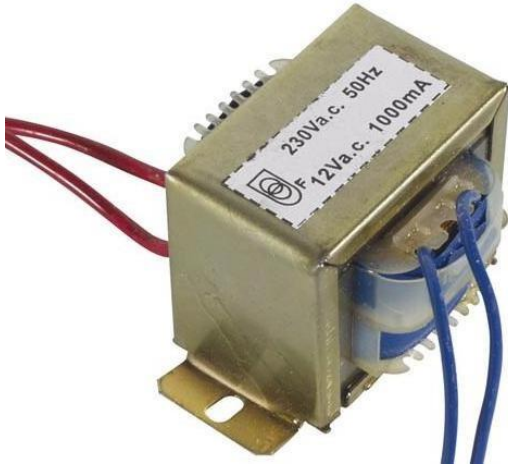
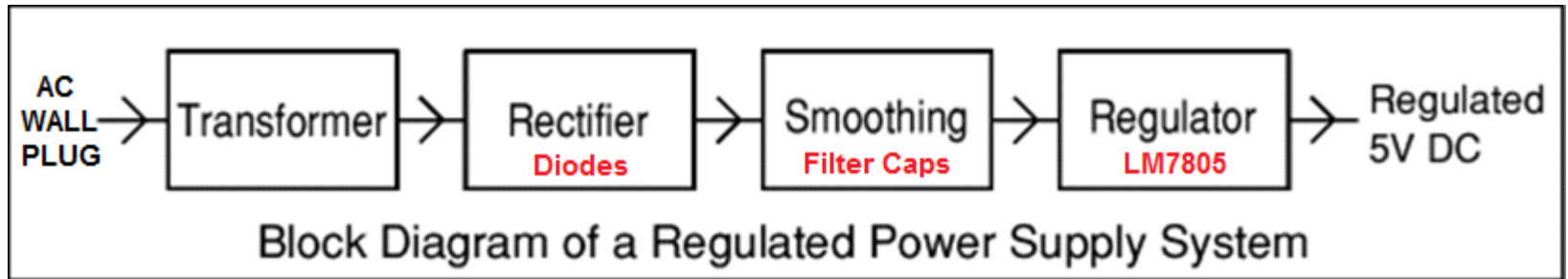
Exam Question

- B-003-008-005; In a regulated power supply, the output of the filter connects to the _____.
- a) regulator
 - b) transformer
 - c) rectifier
 - d) output

Exam Question

- B-003-008-006; In a regulated power supply, the _____ is connected to the regulator.
 - a) output
 - b) rectifier
 - c) input
 - d) transformer

Block diagram - Overview



Questions?

