Technician Licensing Class

Supplement T5
Electrical/Electronic Principles
4 Exam Questions, 4 Groups

**TSA:** Electrical principles; current and voltage, conductors and insulators, alternating and direct current

- **TSA-1** Electrical current is measured in amperes.
- **TSA-2** Electrical power is measured in watts.
  - The power meter outside is called 'watt meter'.
- **TSA-3** Current is the name for the flow of electrons in an electric circuit.
  - Think of the flow of water in a pipe (not the force).
- **TSA-4** Direct current is the name for a current that flows only in one direction.

- **TSA-5** Voltage is the electrical term for the electromotive force (EMF) that causes electron flow.
  - Think of voltage as water pressure in the pipes (not the flow).
- **TSA-6** A mobile transceiver usually requires about 12 volts.

- **TSA-7** Copper is a good electrical conductor.
  - Copper is a good conductor.
- **TSA-8** Glass is a good electrical insulator.
  - Glass is a good insulator.

**TSA:** Electrical principles; current and voltage, conductors and insulators, alternating and direct current

- **TSA-9** Alternating current is the name for a current that reverses direction on a regular basis.

- **TSA-10** Power is the term that describes the rate at which electrical energy is used.

- **TSA-11** The volt is the basic unit of electromotive force.

**TSA:** Electrical principles; current and voltage, conductors and insulators, alternating and direct current

- **TSA-12** Voltage is the electrical term for the electromotive force (EMF) that causes electron flow.
  - Think of voltage as water pressure in the pipes (not the flow).
- **TSA-13** A mobile transceiver usually requires about 12 volts.

- **TSA-14** Copper is a good electrical conductor.
  - Copper is a good conductor.
- **TSA-15** Glass is a good electrical insulator.
  - Glass is a good insulator.

**TSA:** Electrical principles; current and voltage, conductors and insulators, alternating and direct current

- **TSA-16** 1,500 milliamperes is 1.5 amperes.
- **TSA-17** 1500 kHz is another way to specify a radio signal frequency of 1,500,000 hertz.

- **TSA-18** One thousand volts are equal to one kilovolt.
  - One thousand volts are equal to one kilovolt.
- **TSA-19** One one-millionth of a volts is equal to one microvolt.
  - One one-millionth of a volts is equal to one microvolt.
- **TSA-20** 0.5 watts is equivalent to 500 milliwatts.
  - 0.5 watts is equivalent to 500 milliwatts.

- **TSA-21** If an ammeter calibrated in amperes is used to measure a 3000-milliampere of current, the reading would it to be 3 amperes.
The basic unit of capacitance is the farad.

The basic unit of inductance is the henry.

Hertz is the unit of frequency.

- Radio waves is a usual name for electromagnetic waves that travel through space.

Electromagnetic waves are RADIO WAVES.
138 watts of power is being used in a circuit when the applied voltage is 13.8 volts DC and the current is 10 amperes.

\[ P = I \times E \]
\[ P = 10 \times 13.8 \]
\[ P = 138 \text{ watts} \]

30 watts of power is being used in a circuit when the applied voltage is 12 volts DC and the current is 2.5 amperes.

\[ P = I \times E \]
\[ P = 2.5 \times 12 \]
\[ P = 30 \text{ watts} \]
Ohm’s Law

1. The resistance of a circuit in which a current of 3 amperes flows through a resistor connected to 90 volts is 30 ohms.
   - Solving for “R” so cover up the “R” and plug in the other two numbers
   - E is given as 90 volts and I is given as 3 amperes
     \[ R = \frac{E}{I} \]
     \[ R = \frac{90}{3} \]
     \[ R = 30 \text{ ohms} \]

2. The resistance in a circuit for which the applied voltage is 12 volts and the current flow is 1.5 amperes is 8 ohms.
   - Solving for “R” so cover up the “R” and plug in the other two numbers
   - E is given as 12 volts and I is given as 1.5 amperes
     \[ R = \frac{E}{I} \]
     \[ R = \frac{12}{1.5} \]
     \[ R = 8 \text{ ohms} \]

3. The resistance of a circuit that draws 4 amperes from a 12-volt source is 3 ohms.
   - Solving for “R” so cover up the “R” and plug in the other two numbers
   - E is given as 12 volts and I is given as 4 amperes
     \[ R = \frac{E}{I} \]
     \[ R = \frac{12}{4} \]
     \[ R = 3 \text{ ohms} \]

4. The current flowing through a 100-ohm resistor connected across 200 volts is 10 amperes.
   - Solving for “I” so cover up the “I” and plug in the other two numbers
   - E is given as 200 volts and R is given as 100 ohms
     \[ I = \frac{E}{R} \]
     \[ I = \frac{200}{100} \]
     \[ I = 2 \text{ amperes} \]

5. The current flowing through a 24-ohm resistor connected across 240 volts is 10 amperes.
   - Solving for “I” so cover up the “I” and plug in the other two numbers
   - E is given as 240 volts and R is given as 24 ohms
     \[ I = \frac{E}{R} \]
     \[ I = \frac{240}{24} \]
     \[ I = 10 \text{ amperes} \]
Ohm’s Law

- **T5D10** The voltage across a 2-ohm resistor if a current of 0.5 amperes flows through it is 1 volt.
  - Solving for “E” so cover up the “E” and plug in the other two numbers
  - I is given as 0.5 amperes and R is given as 2 ohms
  
  \[ E = I \times R \]
  
  \[ E = 0.5 \times 2 \]
  
  \[ E = 1 \text{ volt} \]

- **T5D11** The voltage across a 10-ohm resistor if a current of 1 amperes flows through it is 10 volts.
  - Solving for “E” so cover up the “E” and plug in the other two numbers
  - I is given as 1 amperes and R is given as 10 ohms
  
  \[ E = I \times R \]
  
  \[ E = 1 \times 10 \]
  
  \[ E = 10 \text{ volts} \]

- **T5D12** The voltage across a 10-ohm resistor if a current of 2 amperes flows through it is 20 volts.
  - Solving for “E” so cover up the “E” and plug in the other two numbers
  - I is given as 2 amperes and R is given as 10 ohms
  
  \[ E = I \times R \]
  
  \[ E = 2 \times 10 \]
  
  \[ E = 20 \text{ volts} \]

Element 2 Technician Class Question Pool

**T5**
Electrical principles, math for electronics, electronic principles, Ohm’s Law
[4 Exam Questions – 4 Groups]

Valid July 1, 2010
Through June 30, 2014

T5A01  Electrical current is measured in which of the following units?

A. Volts  
B. Watts  
C. Ohms  
D. Amperes
T5A02  Electrical power is measured in which of the following units?

A. Volts  
B. Watts  
C. Ohms  
D. Amperes

T5A03  What is the name for the flow of electrons in an electric circuit?

A. Voltage  
B. Resistance  
C. Capacitance  
D. Current

T5A04  What is the name for a current that flows only in one direction?

A. Alternating current  
B. Direct current  
C. Normal current  
D. Smooth current

T5A05  What is the electrical term for the electromotive force (EMF) that causes electron flow?

A. Voltage  
B. Ampere-hours  
C. Capacitance  
D. Inductance

T5A06  How much voltage does a mobile transceiver usually require?

A. About 12 volts  
B. About 30 volts  
C. About 120 volts  
D. About 240 volts

T5A07  Which of the following is a good electrical conductor?

A. Glass  
B. Wood  
C. Copper  
D. Rubber
T5A08 Which of the following is a good electrical insulator?

A. Copper  
B. Glass  
C. Aluminum  
D. Mercury

T5A09 What is the name for a current that reverses direction on a regular basis?

A. Alternating current  
B. Direct current  
C. Circular current  
D. Vertical current

T5A10 Which term describes the rate at which electrical energy is used?

A. Resistance  
B. Current  
C. Power  
D. Voltage

T5A11 What is the basic unit of electromotive force?

A. The volt  
B. The watt  
C. The ampere  
D. The ohm

T5B01 How many milliamperes is 1.8 amperes?

A. 15 milliamperes  
B. 150 milliamperes  
C. 1,500 milliamperes  
D. 15,000 milliamperes

T5B02 What is another way to specify a radio signal frequency of 1,500,000 hertz?

A. 1500 kHz  
B. 1500 MHz  
C. 15 GHz  
D. 15 kHz
T5B03  How many volts are equal to one kilovolt?

A. One one-one thousandth of a volt
B. One hundred volts
C. One thousand volts
D. One million volts

T5B04  How many volts are equal to one microvolt?

A. One one-millionth of a volt
B. One million volts
C. One thousand kilovolts
D. One one-thousandth of a volt

T5B05  Which of the following is equivalent to 500 milliwatts?

A. 0.02 watts
B. 0.5 watts
C. 5 watts
D. 50 watts

T5B06  If an ammeter calibrated in amperes is used to measure a 3000-milliampere current, what reading would it show?

A. 0.003 amperes
B. 0.3 amperes
C. 3 amperes
D. 3,000,000 amperes

T5B07  If a frequency readout calibrated in megahertz shows a reading of 3.525 MHz, what would it show if it were calibrated in kilohertz?

A. 0.003525 kHz
B. 36.25 kHz
C. 3.525 kHz
D. 3,525,000 kHz

T5B08  How many microfarads are 1,000,000 picofarads?

A. 0.001 microfarads
B. 1 microfarad
C. 1000 microfarads
D. 1,000,000,000 microfarads
T5B09  What is the approximate amount of change, measured in decibels (dB), of a power increase from 5 watts to 10 watts?

A. 2 dB  B. 3 dB  C. 5 dB  D. 10 dB

T5B10  What is the approximate amount of change, measured in decibels (dB), of a power decrease from 12 watts to 3 watts?

A. 1 dB  B. 3 dB  C. 6 dB  D. 9 dB

T5B11  What is the approximate amount of change, measured in decibels (dB), of a power increase from 20 watts to 200 watts?

A. 10 dB  B. 12 dB  C. 18 dB  D. 28 dB

T5C01  What is the ability to store energy in an electric field called?

A. Inductance  B. Resistance  C. Tolerance  D. Capacitance

T5C02  What is the basic unit of capacitance?

A. The farad  B. The ohm  C. The volt  D. The henry

T5C03  What is the ability to store energy in a magnetic field called?

A. Admittance  B. Capacitance  C. Resistance  D. Inductance
T5C04  What is the basic unit of inductance?

A. The coulomb  
B. The farad  
C. The henry  
D. The ohm

T5C05  What is the unit of frequency?

A. Hertz  
B. Henry  
C. Farad  
D. Tesla

T5C06  What is the abbreviation that refers to radio frequency signals of all types?

A. AF  
B. HF  
C. RF  
D. VHF

T5C07  What is a usual name for electromagnetic waves that travel through space?

A. Gravity waves  
B. Sound waves  
C. Radio waves  
D. Pressure waves

T5C08  What is the formula used to calculate electrical power in a DC circuit?

A. Power (P) equals voltage (E) multiplied by current (I)  
B. Power (P) equals voltage (E) divided by current (I)  
C. Power (P) equals voltage (E) minus current (I)  
D. Power (P) equals voltage (E) plus current (I)

T5C09  How much power is being used in a circuit when the applied voltage is 13.8 volts DC and the current is 10 amperes?

A. 138 watts  
B. 0.7 watts  
C. 23.8 watts  
D. 3.8 watts
T5C10 How much power is being used in a circuit when the applied voltage is 12 volts DC and the current is 2.5 amperes?

A. 4.8 watts  
B. 30 watts  
C. 14.5 watts  
D. 0.208 watts

T5C11 How many amperes are flowing in a circuit when the applied voltage is 12 volts DC and the load is 120 watts?

A. 0.1 amperes  
B. 10 amperes  
C. 12 amperes  
D. 132 amperes

T5D01 What formula is used to calculate current in a circuit?

A. Current (I) equals voltage (E) multiplied by resistance (R)  
B. Current (I) equals voltage (E) divided by resistance (R)  
C. Current (I) equals voltage (E) added to resistance (R)  
D. Current (I) equals voltage (E) minus resistance (R)

T5D02 What formula is used to calculate voltage in a circuit?

A. Voltage (E) equals current (I) multiplied by resistance (R)  
B. Voltage (E) equals current (I) divided by resistance (R)  
C. Voltage (E) equals current (I) added to resistance (R)  
D. Voltage (E) equals current (I) minus resistance (R)

T5D03 What formula is used to calculate resistance in a circuit?

A. Resistance (R) equals voltage (E) multiplied by current (I)  
B. Resistance (R) equals voltage (E) divided by current (I)  
C. Resistance (R) equals voltage (E) added to current (I)  
D. Resistance (R) equals voltage (E) minus current (I)

T5D04 What is the resistance of a circuit in which a current of 3 amperes flows through a resistor connected to 90 volts?

A. 3 ohms  
B. 30 ohms  
C. 93 ohms  
D. 270 ohms
T5D05 What is the resistance in a circuit for which the applied voltage is 12 volts and the current flow is 1.5 amperes?

A. 18 ohms  
B. 0.125 ohms  
C. 8 ohms  
D. 13.5 ohms

T5D06 What is the resistance of a circuit that draws 4 amperes from a 12-volt source?

A. 3 ohms  
B. 16 ohms  
C. 48 ohms  
D. 8 ohms

T5D07 What is the current flow in a circuit with an applied voltage of 120 volts and a resistance of 80 ohms?

A. 9600 amperes  
B. 200 amperes  
C. 0.667 amperes  
D. 1.5 amperes

T5D08 What is the current flowing through a 100-ohm resistor connected across 200 volts?

A. 20,000 amperes  
B. 0.5 amperes  
C. 2 amperes  
D. 100 amperes

T5D09 What is the current flowing through a 24-ohm resistor connected across 240 volts?

A. 24,000 amperes  
B. 0.1 amperes  
C. 10 amperes  
D. 216 amperes

T5D10 What is the voltage across a 2-ohm resistor if a current of 0.5 amperes flows through it?

A. 1 volt  
B. 0.25 volts  
C. 2.5 volts  
D. 1.5 volts
T5D11  What is the voltage across a 10-ohm resistor if a current of 1 ampere flows through it?

A. 1 volt  
B. 10 volts  
C. 11 volts  
D. 9 volts

T5D12  What is the voltage across a 10-ohm resistor if a current of 2 amperes flows through it?

A. 8 volts  
B. 0.2 volts  
C. 12 volts  
D. 20 volts