Bell South (2005) Basic Electronics Test

**What does the Basic Electronics Test cover?**

**DC Circuit Analysis:** *Knowledge and Skill Requirements*

* Use Ohm’s law to solve for E, I or R
* Understand the relationship of conductor size and length to resistance
* Use the power formula to solve for P, E or I
* Understand the relationships of efficiency, power input and power output in a circuit
* Calculate the total resistance of a series resistance circuit
* Calculate the total resistance of a parallel resistance circuit
* Simplify series-parallel resistance networks in order to determine the E, I, R or P across any network component using Kirchhoff’s Law

**AC Circuit Analysis:** *Knowledge and Skill Requirements*

* Understand the concept of a sine wave including phase, frequency, period and amplitude
* Understand the relationships among rms, peak, and peak-to-peak voltage in alternating current circuits and be able to solve for any of these using a formula provided
* Understand the concepts of capacitance and inductance
* Understand the relationship of capacitive and inductive reactance with frequency
* Recognize the symbols for reactance—capacitive and inductive
* Understand the E and I phase relationships in reactive (inductive or capacitive) circuits
* Understand the concepts of true power, apparent power, and power factor (PF) in a reactive circuit and be able to solve for any of these using a formula

**Transmission Lines:** *Knowledge and Skill Requirements*

* Understand the concept of impedance matching and the effects of mismatch on the transfer of energy
* Understand how the primary constants (resistance, capacitance and inductance) of a transmission line affect the attenuation of a signal
* Understand the decibel concept and how it applies to signal transmission
* Convert from a power or voltage ratio to decibels and vice versa
* Convert from an absolute power or voltage value to decibels and vice versa
* Calculate attenuation over a transmission line using decibels (dB)
* Understand the purpose and function of various protective devices and recognize their schematic symbols

**Electronics Fundamentals:** *Knowledge and Skill Requirements*

* Recognize various types of passive frequency filters and understand how they work
* Understand basic solid state theory of a diode
* Understand the concept of forward and reverse bias of a diode
* Understand the function of various diode types and their application in a circuit
* Recognize the electronic symbols for various diode types
* Understand basic transistor theory and the concept of gain in an amplifier
* Recognize the schematic symbols for various transistor types
* Understand the function of a transistor in a simple circuit
* Understand basic transistor biasing and stabilization concepts
* Understand how AC is converted to DC by rectification and filtering in a power supply
* Recognize the type of rectifier configurations—half-wave and full-wave rectification
* Understand the concept of power supply regulation and how transistors and diodes are used to perform this function
* Know how to trace signal flow in a simple circuit such as a power supply or amplifier
* Understand the basic functions of multimeters—both digital and analog
* Know how to use a multimeter to troubleshoot circuit components such as diodes, capacitors, inductors and resistors
* Know how to use a multimeter to find a short and open in a simple circuit
* Know how to use voltage multipliers (high-voltage probes) to extend a multimeter’s range
* Know how to use current multipliers (current shunts) with a multimeter to extend its range
* Interpret multimeter readings when using a high-voltage probe by calculating the voltage drop across the probe (Ohm’s law) based on the combined series resistance of the probe and multimeter input
* Interpret the multimeter reading when using a current shunt based on the voltage drop across the shunt and its resistance

**Applied Math:** *Knowledge and Skill Requirements*

* Add, subtract, multiply, and divide whole numbers and decimals
* Manipulate positive and negative numbers
* Manipulate powers of ten and logarithms
* Understand symbols for subunits of electrical quantities and be able to convert from one subunit to another (Examples: k = kilo = 1000, μ = micro = 10-6)
* Solve equations given a formula such as Ohm’s law
* Understand what *direct* and *inverse* relationships are

**Use of a Scientific Calculator:** *Knowledge and Skill Requirements*

* Use the proper key stroke sequence to apply a formula
* Store and recall values in memory
* Calculate using exponents, reciprocals, powers and roots
* Determine the log and log-1 (anti-log) of a given ratio or value
* Determine the sin, cos, sin-1 or cos-1 of a given phase relationship

The practice test and other info (including the above) is found at <http://www.asisvcs.com/publications/pdf/710042.pdf>