



BASIC ELECTRONICS CERTIFICATION COMPETENCIES—2009

(As suggested for segmenting the Associate CET Competencies into 5 BASIC areas: DC; AC; Analog; Digital; and Comprehensive)

1.0 Basic Electrical Theory

- 1.1 Describe the causes and effects of static electricity
- 1.2 Describe atomic structure, the components of the atom, their charges and importance to electronics technology
- 1.3 Explain electronic physics terminology of work and energy
- 1.4 Explain the different forms of energy and their applications

2.0 Magnetism

- 2.1 Explain basic electrical and magnetic properties
- 2.2 Describe the properties of magnetic materials
- 2.3 Explain magnetic fields and lines of force
- 2.4 Explain magnetomotive force

3.0 Basic Electrical Safety

- 3.1 Safe practices and standards
 - 3.1.1 Describe personal safety precautions for working with electric and electronic devices
- 3.2 Electrical shock
 - 3.2.1 Describe the human physiological reactions electrical shock causes.
 - 3.2.2 List various degrees of current the human body can tolerate.
- 3.3 Emergency response
 - 3.3.1 Explain the concept of First Aid and its particular importance to workers in electric and electronic fields
 - 3.3.2 Explain precautions needed in the area of electronic safety
- 3.4 Fire Safety
 - 3.4.1 Describe the different classes (A, B, C, & D) of fires and the type of extinguishers used to fight them.
 - 3.4.2 List applicable governing fire safety regulations NEC (National Electrical Code) and NFPA 70 (National Fire Protection Association)

4.0 Electronic Equipment

- 4.1 Explain multimeter construction, components and usage
- 4.2 List the uses for light level meters

5.0 Electronic Components

- 5.1 Identify the following electronic components and their usages
 - 5.1.1 Capacitor
 - 5.1.2 Resistors
 - 5.1.3 Insulators
 - 5.1.4 Conductors
 - 5.1.5 Switches
 - 5.1.6 Fuses
 - 5.1.7 Circuit Breakers
 - 5.1.8 Batteries

6.0 Ohms Law for Electronics

- 6.1 Summarize Ohms law
- 6.2 Calculate current, voltage or resistance using Ohms Law
- 6.3 Define Joules and Kilowatt-hour as an energy unit
- 6.4 Describe Watts Law
- 6.5 Explain the characteristics of DC resistance

7.0 Basic Mathematics for Electronics

- 7.1 Demonstrate the functions of a scientific calculator
- 7.2 Explain basic algebraic math and its application in DC electronics
- 7.3 Identify the scientific symbols used in DC electronics
- 7.4 Convert fixed numbers to scientific notation
- 7.5 Identify the fundamental and supplementary units that are the bases of the International System of Units (SI)
- 7.6 Explain the following metric prefixes.
 - 7.6.1 Peta
 - 7.6.2 Tera
 - 7.6.3 Giga
 - 7.6.4 Mega
 - 7.6.5 kilo
 - 7.6.6 milli
 - 7.6.7 micro
 - 7.6.8 nano
 - 7.6.9 pico
- 7.7 Demonstrate standard metric conversions.
- 7.8 Explain algebraic equations relevant to DC circuitry.

8.0 Electronic Measurements

- 8.1 Describe the following electronic measurements and their application to DC electronics:
 - 8.1.1 Current
 - 8.1.2 Voltage
 - 8.1.3 Resistance
 - 8.1.4 Power

9.0 Series Circuits for Electronics

- 9.1 Explain how a series circuit is used in DC electronic equipment.
- 9.2 Find total resistance in a series circuit
- 9.3 Calculate an unknown current, voltage or resistance in a series circuit, using Ohms law.
- 9.4 Describe Kirchoff's voltage law in a series circuit:

10.0 Parallel Circuits for Electronics

- 10.1 Explain how a parallel circuit is used in DC electronic equipment.
- 10.2 Solve for total resistance of a parallel circuit
- 10.3 Apply Kirchoff's current law in a parallel circuit
- 10.4 Calculate current, in a parallel circuit, using the current-divider rule.

11.0 Series/Parallel Combination Circuits for Electronics

- 11.1 Describe the basic series/parallel combination circuit
- 11.2 Calculate current, voltage, and resistance in a combination circuit
- 11.3 Describe how Thevenin's theorem is used to simplify an equivalent series/parallel circuit
- 11.4 Solve for an unknown value in a combination circuit using Kirchoff's law.
- 11.5 Define Wheatstone bridge circuit and its usage
- 11.6 Identify unknown voltages, currents, resistances and power dissipation in a loaded voltage divider circuit.

12.0 Battery Power Supplies

- 12.1 Describe battery construction
- 12.2 Describe battery ratings

End of DC BASICS Competencies Listing (with 12 major Categories)

Notes: The purpose in distributing the above Competencies list is to provide a detailed syllabus for electronics educational institutions and instructors. Also to go further and explain what the student should be able to do with each of the items included in the Categories and Competencies listings.

Find An ETA Test Site:

<http://www.eta-i.org/testing.html>

Suggested study texts:

The 2010 Associate CET Study Guide; ISBN 1-891749-03X; ETA International; 2010; —
Available through ETA at 800-288-3824, \$60

Electronics; Principles and Applications, 6E; ISBN 978-0078288937; Schuler;
Glencoe/McGraw Hill, 2002

Introduction to Electricity, Electronics, and Electromagnetics, 5E; ISBN 978-0130105738;
Boylestad, Nashelsky; Prentice Hall; 2001

Mastering Technical Mathematics, 3E; ISBN 978-0071494489; Gibilisco, Crowhurst; McGraw-Hill / TAB Electronics; 2007

Electronics Principles, 7E; ISBN 978-0072975277; Malvino, Bates; McGraw-Hill Higher Education; 2007

Electronic Communications, 6E; ISBN 978-0070571570; Shrader; McGraw-Hill Co; 1990

How to Test Almost Everything Electronic; ISBN 978-0830641277; Horn; McGraw-Hill/TAB Elec. 1993

Basic Electronics Theory With Projects & Experiments, 4E; ISBN 978-0830642007; Horn; McGraw-Hill/TAB Elec. 1993

The Soldering Handbook, 3E; ISBN 978-0871716187; Vianco; American Welding Society; 2000

Introductory DC / AC Electronics, 5E; ISBN 978-0130310859; Cook; Prentice Hall; 2002

Introduction to Electronics; ISBN 978-0534012434; Crozier; Breton Pub.; 1983

There Are No Electrons: Electronics for Earthlings; ISBN 978-0962781599; Amdahl; Clearwater Pub.; 1991

Becoming An Electronics Technician, 4E; ISBN 978-0130932198; Reis; Prentice Hall; 2001