



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 Numbering Systems and Conversions

- 1.1 Identify Decimal system characters
- 1.2 Describe essential elements of the binary, octal and hexadecimal numbering system
- 1.3 Convert decimal to binary, octal and hexadecimal
- 1.4 Convert octal to decimal, binary and hexadecimal
- 1.5 Convert hexadecimal to decimal, binary and octal
- 1.6 Explain the difference between Binary-Coded-Decimal and binary
- 1.7 Explain Boolean algebra and its use in digital circuitry

2.0 Block Diagrams—Schematics-Wiring Diagrams

- 2.1 Identify common electrical/electronic symbols
- 2.2 Explain how block diagrams are used for troubleshooting and maintenance of electronics products
- 2.3 Explain the differences between wiring prints, schematics and block diagrams
- 2.4 Describe the purpose and use of test points and indicate their likely placement on schematics
- 2.5 Point out common drafting principles used for electronic and electrical drawings
- 2.6 Explain methods used for signal tracing
- 2.7 Explain the methods of using flow diagrams/charts

3.0 Test Equipment & Measurements

- 3.1 List the uses and precautions for logic test probes
- 3.2 Explain how logic pulsers are used

4.0 Safety Precautions

- 4.1 Explain static causes and CMOS damage prevention straps, mats and grounding technology

5.0 Theory of Digital Logic Functions and Circuitry

- 5.1 Describe ASCII code
- 5.2 Identify each basic digital gate
- 5.3 Construct truth tables for common gates
- 5.4 Explain how counters operate
- 5.5 Explain how registers operate and their purposes
- 5.6 Explain the purpose of flip flops and list common types
- 5.7 Explain the purpose of a digital electronic circuitry bus and show how it is connected to various sections of a product
- 5.8 List types of display circuitry and describe how numbers and letters are activated digitally
- 5.9 Explain the purpose of computer clocks
- 5.10 Explain how pulsers are used for digital signal tracing and how logic probes are used to verify states in digital equipment
- 5.11 Describe digital clock usage and timing circuitry

- 5.12 Describe counter and register characteristics
 - 5.12.1 Serial counters
 - 5.12.2 Parallel counters
 - 5.12.3 Ring counters
 - 5.12.4 Mod counters
 - 5.12.5 Parallel-in/Serial-out registers
 - 5.12.6 Serial-in/Parallel-out registers
- 5.13 Describe MOS, CMOS transistor applications
- 5.14 Describe how oscillators and multivibrators are similar and how they differ
- 5.15 Explain wave shaping circuits and explain their purposes
- 5.16 Describe how microprocessors function, and identify their basic components and pin-outs

6.0 Computer Electronics

- 6.1 Describe the major sections of a computer
- 6.2 Demonstrate how the computer block diagram and flow charts are utilized
- 6.3 Describe different types of computer memory and how storage is accomplished
- 6.4 Explain programmable logic controls (PLCs) and list usages
- 6.5 Explain the importance of an Arithmetic logic unit (ALU)
- 6.6 Define ROM, RAM, PROM, EPROM, EEPROM and EAPROM
- 6.7 Explain the importance of databuses and their associated bandwidth.
- 6.8 Describe basic programming concepts
- 6.9 Describe the reasons for different computer languages and their relationships
- 6.10 Define the words 'peripheral device' and list various types
- 6.11 Explain the reasons for using interface devices/chips/cards and name common types

End of DIGITAL BASICS Electronics Competencies Listing

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