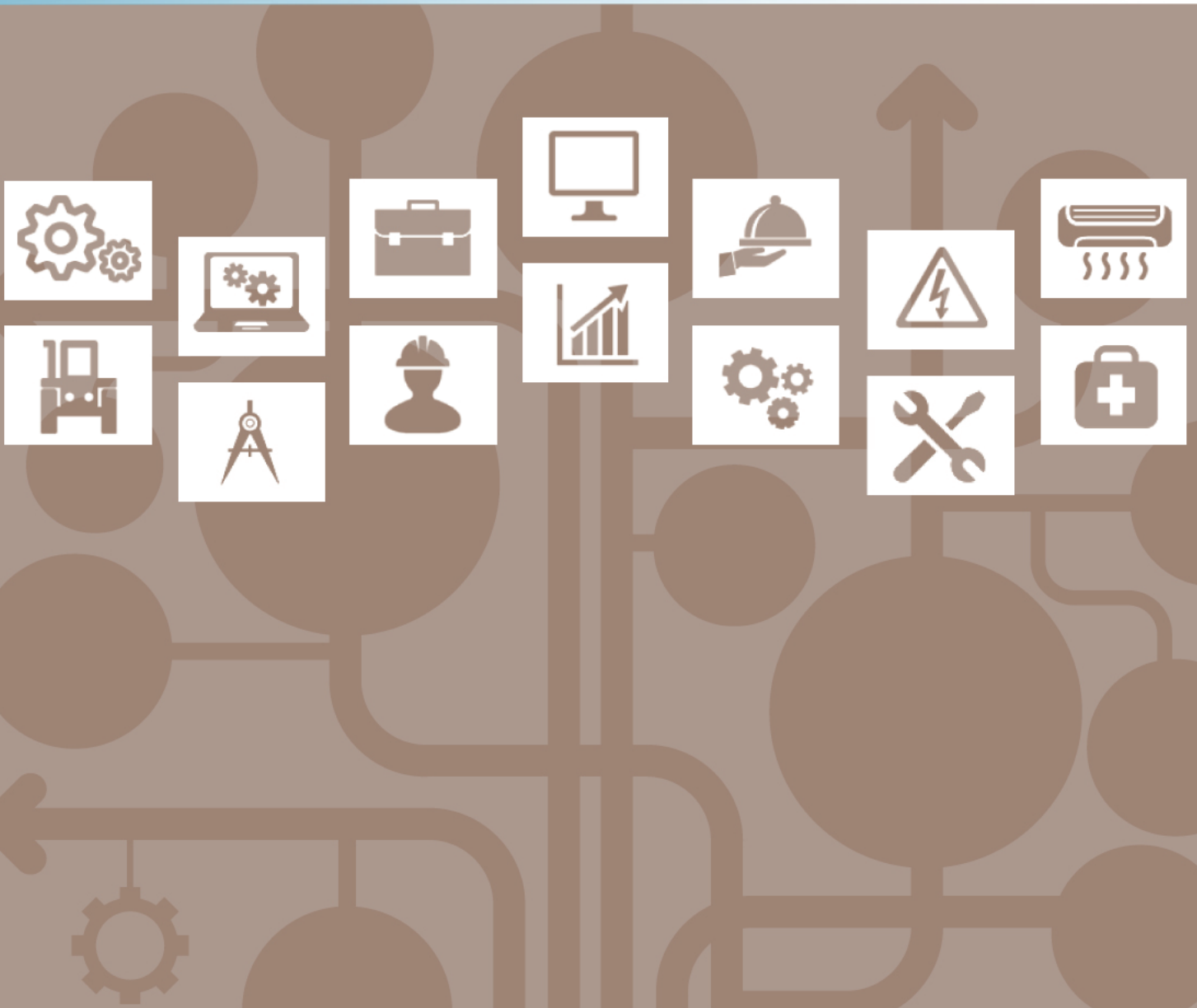




Entry Level Assessment Blueprint

Industrial Electronics



Test Code: 2051 / Version: 01

Specific Competencies and Skills Tested in this Assessment:

DC Electricity

Demonstrate the ability to identify and use the principles of the following:

- Ohm's Law
- Kirchhoff's Law
- Watt's Law
- Series, parallel, series-parallel
- Capacitance
- Inductance
- Voltage cells
- Schematic symbols
- Time constants

AC Circuits

Demonstrate the ability to identify and use the principles of the following:

- Transformer action
- Resonance
- Voltage conversion (RMS, peak, etc.)
- Waveform analysis
- Degrees of displacement
- Reactance
- Impedance
- Filters
- Power factor
- Time/frequency



Fundamentals (covered in the performance test)

Demonstrate the ability to identify and use the principles of the following:

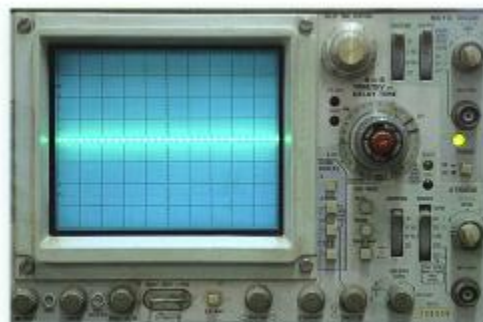
- Component identification
- Circuit characteristics
- Wiring specifications
- Circuit protection

Specific Competencies and Skills continued:

Test Equipment

Demonstrate the ability to identify and use the principles of the following:

- Meter fundamentals
- Oscilloscope operation
- Digital meters
- Milliohm meter
- Transfer curve tracer
- IC analyzer
- Logic probe/pulser probe



Semiconductors

Demonstrate the ability to identify and use the principles of the following:

- Diode fundamentals (bipolar-zener applications)
- Transistor fundamentals
- Field effect transistor (FET) fundamentals

Electronic Circuits

Demonstrate the ability to identify and use the principles of the following:

- Transistor amplifier fundamentals
- Operational amplifier fundamentals
- Differentiator/integrator op-amps circuits
- Voltage regulators
- 555 Timers
- Power supplies
- Oscillators
- Phase-lock loop circuits

Digital/Micro

Demonstrate the ability to identify and use the principles of the following:

- Basic gates
- Boolean expression
- Gate circuits
- Logic specifications
- Circuit identification
- Counter circuits
- Microprocessor fundamentals
- Latches/flip-flops
- Binary numbering systems

Specific Competencies and Skills continued:**Digital/Micro, continued**

- Discrete gates
- D/A, A/D
- Multiplexers/demultiplexers

Transducers

Demonstrate the ability to identify and use the principles of the following:

- Thermistors
- Resistive temperature detectors (RTDs)
- Optical devices
- Thermocouples
- Proximity and resistive devices

Ladder Logic and Motors

Demonstrate the ability to identify and use the principles of the following:

- DC motors
- Synchro-systems
- AC induction motors
- Horsepower ratings
- Three-phase power
- Motor starter circuits
- Ladder diagrams
- JIC symbols

Safety

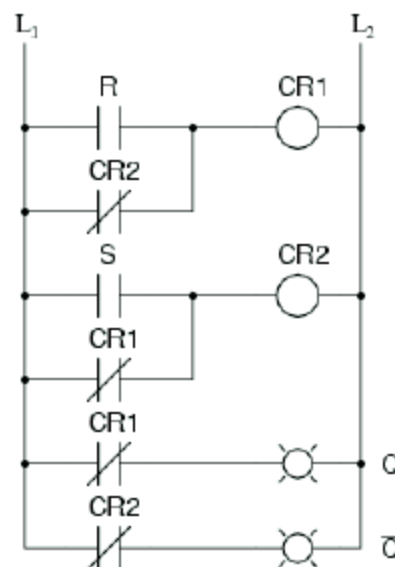
Demonstrate the ability to use principles of safety for the following:

- Personal/ shop/equipment

Programmable Logic Controllers

Demonstrate the ability to identify and use the principles of the following:

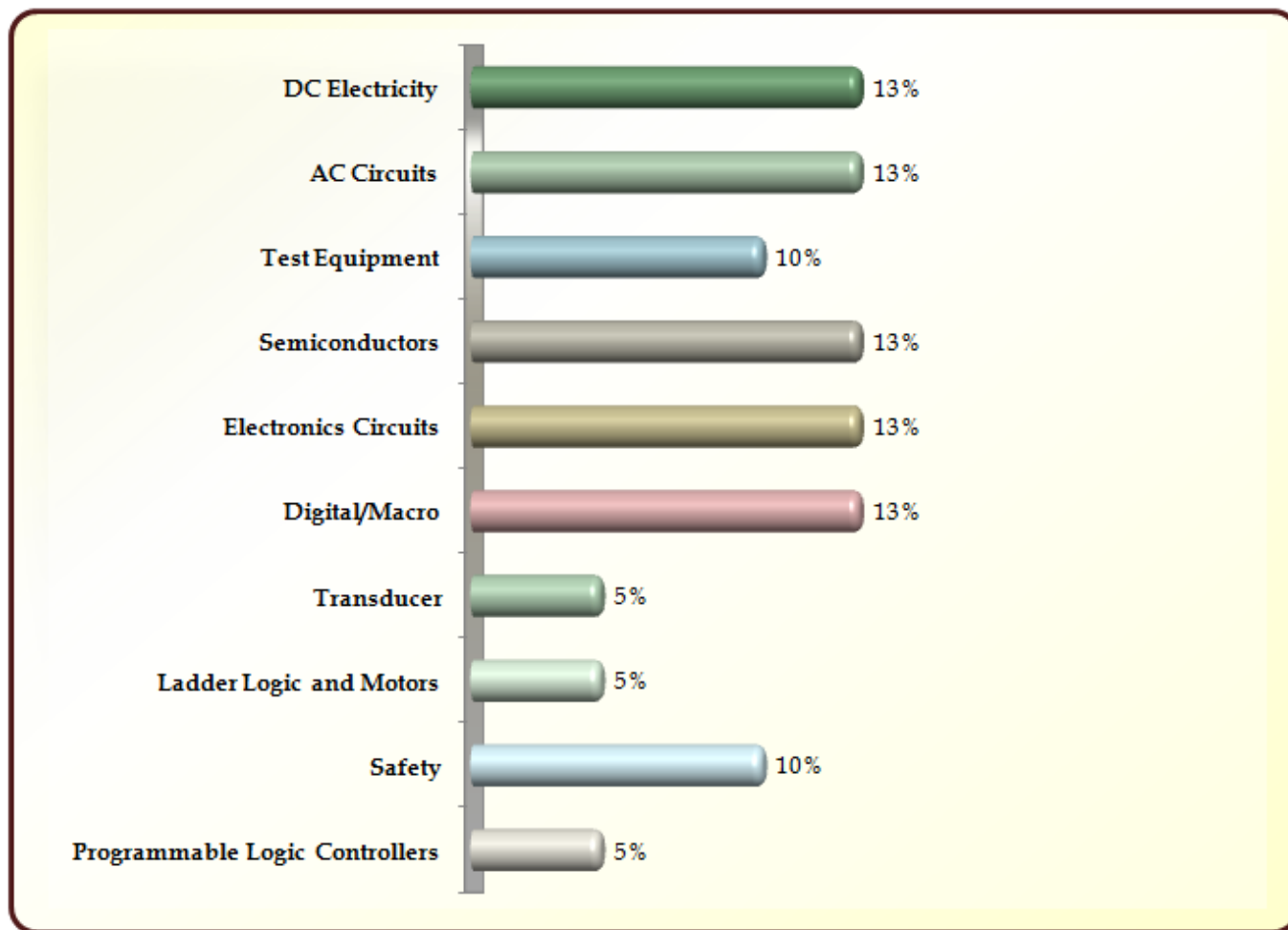
- PLC programming (ladder logic)
- PLC input/output capabilities
- PLC field wiring
- PLC trouble shooting



Written Assessment:

Administration Time: 3 hours

Number of Questions: 197

Areas Covered:

Sample Questions:

A positive ion is produced when an atom

- A. loses an electron
- B. loses a proton
- C. gains an electron
- D. gains a proton

If a transformer with a 1:5 ratio is rated at 500 volt-amperes and has an input voltage of 100 volts, what would be the output current assuming 100 percent efficiency?

- A. 1.0 amp
- B. 2.5 amps
- C. 5 amps
- D. 25 amps

To remove a DC offset from the output of a frequency generator connected to a test circuit, the technician must

- A. change the DC bias on the test circuit
- B. place a capacitor in series with the output of the generator and the test circuit
- C. change the scope probe setting to times 10
- D. set the scope to measure AC

The junction field effect transistor (JFET) operates in the _____ mode.

- A. depletion
- B. enhancement
- C. depletion or enhancement
- D. depletion and enhancement

A 4-input NOR gate has how many possible input conditions?

- A. 2
- B. 4
- C. 8
- D. 16

Two 40-microfarad capacitors rated at 150 volts each, connected in series, would have a combined rating of

- A. 20 microfarads at 150 volts
- B. 20 microfarads at 300 volts
- C. 80 microfarads at 300 volts
- D. 80 microfarads at 150 volts

Sample Questions (continued)

Inductance is the electrical property that

- A. opposes DC more than AC
- B. converts electricity into heat
- C. opposes changes in current
- D. opposes changes in voltage

The DIAC is also known as a

- A. unilateral switch
- B. bilateral switch
- C. Zener diode
- D. blocking oscillator

An SCR is basically a

- A. silicon transistor with a base, emitter, and collector
- B. PNP device with four leads attached to the four layers
- C. PNP device with a gate, cathode, and anode leads
- D. three layer device with a gate, base, and anode

A transducer is a device that

- A. conveys a process variable from one point to another
- B. transmits a signal from a sensing element to an instrument
- C. converts low mechanical power to a higher level of power
- D. converts one form of energy into another

Performance Assessment:

Administration Time: 3 hours

Number of Jobs: 7

Areas Covered:

14% **Semiconductor Testing**

Identification of components; determination of component quality and lead configuration; use of test equipment, and time to complete Job 1.

14% **Soldering/De-soldering**

Techniques for soldering and de-soldering components; choice, preparation and use of tools and equipment; safety, and time to complete Job 2.

14% **Test Equipment**

Use of meters; measurement of voltage, resistance, current; use of schematic, and time to complete Job 3.

14% **Circuit Construction**

Principles of AC and DC electricity; use of schematics; assembly procedures and techniques; component selection; safety, and time to complete Job 4.

16% **Oscilloscope Usage**

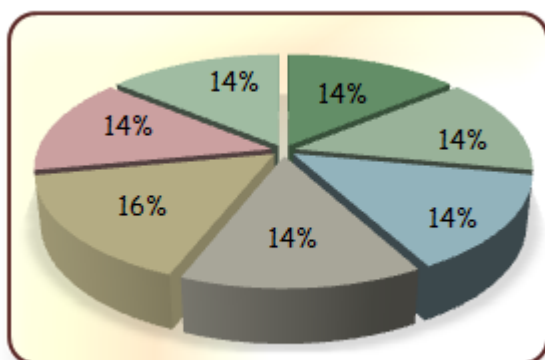
Use and care of equipment; calibration procedures; AC and DC measurements; interpretation of waveforms; use of schematics, and time to complete Job 5.

14% **Troubleshooting**

Problem diagnosis; identification of components (satisfactory or defective); use of test equipment; procedures and techniques for restoring circuit operation, and time to complete Job 6.

14% **Digital/Micro**

Application of gate logic; gate substitution; use of diagram; circuit construction; creation of truth table; observation techniques, and time to complete Job 7.



Sample Job: Test Equipment

Maximum Time: 25 minutes

Participant Activity: The participant will measure the voltage drop, the current and the resistance for each resistor. Then the total voltage, current and resistance will be measured for the entire circuit.

