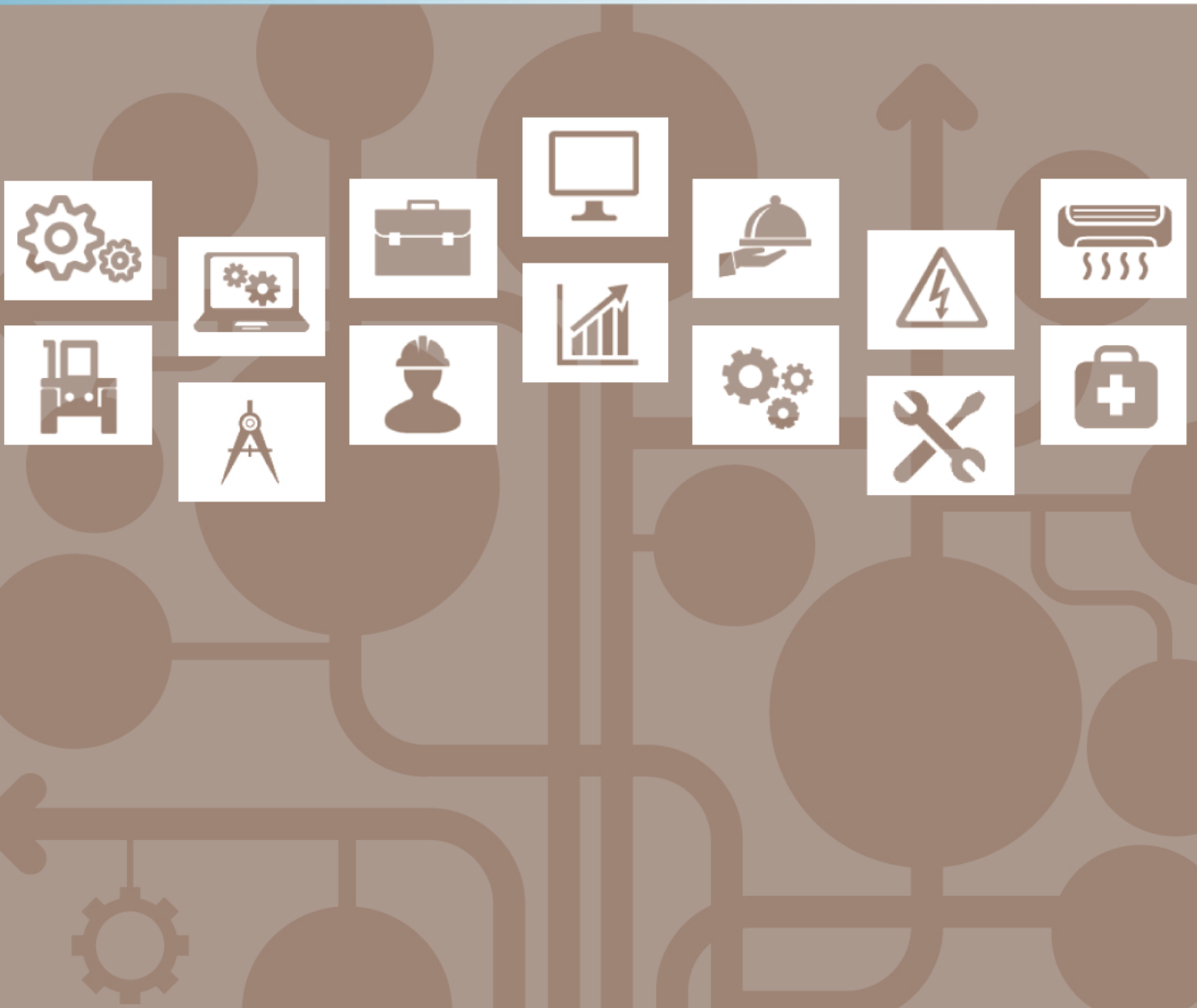


Entry Level Assessment Blueprint

Mechatronics - Level 1



Specific Competencies and Skills Tested in this Assessment:

Introduction to Mechatronics: Safety

- Follow workplace electrical safety guidelines (NEC) (lock-out/tag-out)
- Identify safety components of workplace (e.g., fire protection, emergency exit plans, emergency routes, and confined spaces)
- Wear appropriate personal protective (PPE) safety equipment (NFPA 70-E)
- Interpret major parts of MSDS sheets
- Perform machine guarding procedures
- Administer first aid
- Properly use hand and power tools
- Perform proper HazCom operations (perform proper hazardous waste disposal)
- Follow workplace mechanical safety guidelines (e.g., energy isolation, potential energy)
- Use proper techniques to navigate workplace (walking and working surfaces)



Introduction to Mechatronics: Communication

- Use operating documents and work instructions
- Interpret equipment test, operating, and failure logs
- Verbalize instructions and communicate problems

Instrumentation and Measurement

- Properly use a voltmeter, multimeter, and ammeter
- Properly use a torque wrench
- Read various gauges
- Describe and identify sensors of various functions (e.g., pressure, flow)
- Describe and identify transducers (thermocouples, photoelectric cell)
- Read and convert a standard and metric ruler
- Measure input and output impedance
- Calibrate electrical equipment
- Identify reed sensors
- Diagnose electrical equipment
- Measure angles, square, level, and plumb
- Determine appropriate measurement tool
- Demonstrate proper care and handling of measurement instruments

Specific Competencies and Skills continued:

Electrical

- Apply circuit terminology
- Describe relationships between circuit components
- Describe types of switches (e.g., limit, potentiometer)
- Read resistor color bands
- Use Ohm's and Kirchoff's Laws for voltage and current (AC and DC)
- Understand role of magnetism and electromagnetism
- Describe series and parallel circuits
- Interpret wiring, schematics, and ladder diagrams
- Analyze and troubleshoot circuits
- Describe microprocessors
- Select proper wire size for circuit's (NEC) load
- Describe power supply (transformers, inverters, and generators – 24 volts)



Mechanical

- Differentiate between different types of materials and their properties (plastic, stainless)
- Understand vibration and noise control (ergonomics)
- Understand mechanical valve operation (shut-off)
- Understand bearing properties and uses
- Perform shaft alignment, gear reduction
- Perform speed calculations on gears, sprockets, and pulleys
- Apply gear ratios and direction
- Select type of lubrication
- Read and interpret drawings of mechanical parts (sectional and scale views)
- Describe drive systems (chains and belts; conveyor system)
- Describe proper mounting of components (using proper fasteners)

Hydraulic and Pneumatic Systems

- Differentiate between hydraulic and pneumatic system components
- Identify types of valves (pressure, flow, directions)
- Apply working knowledge of types of cylinders
- Read schematics relating to system components
- Apply Pascal's Law
- Describe hydraulic fluid characteristics
- Identify different hydraulic and pneumatic conductors
- Understand essentials of system filtration

Specific Competencies and Skills continued:

Computer and Control Systems

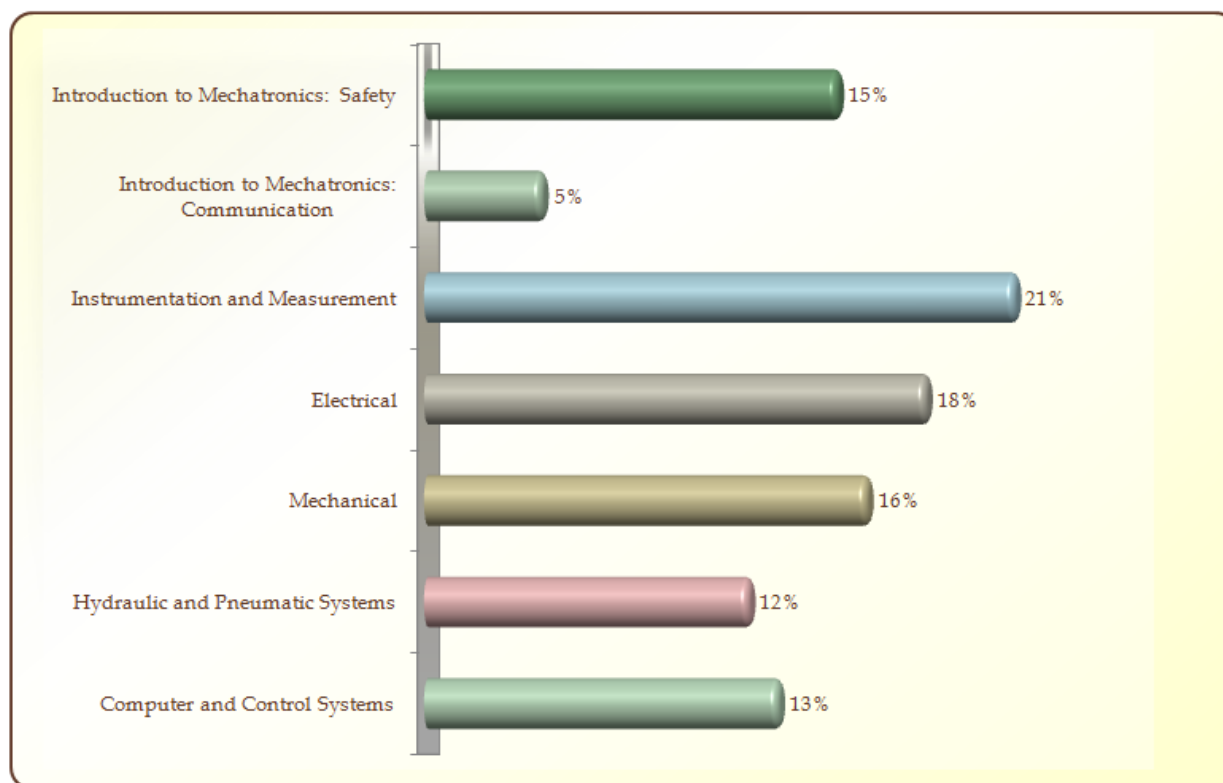
- Identify components of a computer network
- Describe basic functions of PLCs in a system
- Understand truth tables and logic
- Apply basics of CAD
- Understand basics of computer programming
- Download a program to input information into a computer system
- Describe system control and monitoring interfaces
- Identify different types of communication cabling
- Describe wireless versus hardwired systems

Written Assessment:

Administration Time: 3 hours

Number of Questions: 209

Areas Covered:



Sample Questions:

What should be used to feed material into a machine?

- A. joy stick
- B. push stick
- C. your feet
- D. your hands

All hazardous waste containers must be

- A. made of clear materials
- B. plastic
- C. labeled
- D. fire proof

A multimeter meter measures

- A. hertz
- B. impedance and resistance
- C. ohms, amps, and volts
- D. watts

The basic unit of electrical charge is the

- A. coulomb
- B. joule
- C. volt
- D. watt

The most important part of bearing maintenance is

- A. good seals
- B. proper lubrication
- C. even loads
- D. periodic cleaning