

Massachusetts Technical Teacher Testing Program Electronics Content Outline

Written and Performance Exam General Overview

- The intent of this exam is to assess your ability to teach the skills found in the Massachusetts Technical Education Framework.
- This exam is aligned to the frameworks which can be accessed [here](#).
- Many questions and tasks require a synthesis of knowledge based on experience in the field and may not be found in any book.
- Candidates are encouraged to prepare for their exam by reviewing textbooks and reference material which has been listed as part of this exam outline. These resources can be found using online search tools, online vendors, and websites.
- Contact the Technical Teacher Testing Office if you need further assistance in locating resources listed in the exam outline.
- Use this exam outline and the Massachusetts Technical Education Framework to focus your preparation for the exam.

Written Exam

- Number of Questions: 100
- Administration Time: 3 hours
- Administration Method: Remote Proctoring Online Session

Written Exam Content Coverage

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- 10% Health and Safety**
- Health and Safety Regulations, Practices and Work Habits
 - OSHA, Right-to-Know, SDS
 - PPE, LOTO, ESD
 - Ergonomics
- 2% Fundamentals of Electronic Circuit Assembly**
- Component Symbols
 - Printed Circuit Boards (PCBs)
 - Parts List
- 15% Theory and Applications of DC**
- Electronic Circuit Laws
 - Electronic Circuit Theories
- 15% Theory and Applications of AC**
- Calculations in AC Circuits
 - Measurements in AC Circuits

- 12%** ***Theory and Application of Analog Electronics***
 - Analyze Semiconductors
 - Construct and Test Semiconductor Circuits
 - Evaluate Operational Amplifier Circuits

- 22%** ***Theory and Application of Digital Electronics***
 - Calculations in Digital Circuits
 - Identify and Apply Digital Principles
 - Construct and Test Digital Circuits

- 7%** ***Applied Engineering***
 - Engineering Concepts
 - Electric Motors

- 2%** ***Software Applications***
 - PCB Fabrication

- 5%** ***Applied Electronic Devices in a Manufacturing Environment***
 - Electronic Measuring Equipment
 - Oscilloscope, Waveforms
 - Tools Used to Build Electronic Projects

- 10%** ***Advanced Standards***
 - Computer Electronics
 - Computer Sectors, Memory
 - Databases/Bandwidth
 - Optical Electronics
 - Audio and Video Systems

Written Exam Reference Materials (Reference Current Edition)

- **Introduction to Electronics** by Earl Gates (Cengage Learning)
- **Electronics Principles and Applications** by Charles A. Schuler (McGraw-Hill)
- **Digital Electronics** by Roger Tokheim (Glencoe)
- **Digital Systems Principles and Applications** by Ronald J. Tocci (Prentice Hall)
- **Electronics Technicians Association** (www.eta-i.org)

Materials Needed for the Written Exam

- A four-function calculator is included in the online testing system. No other calculators are permitted.
- Scrap paper and pencil/pen are permitted.

Written Exam Sample Items

Each question on the exam consists of one incomplete sentence or question followed by four choices. Some items reference an image or diagram. A few sample items are included below; the correct answer is designated with an asterisk (*).

The induced voltage in a conductor is directly proportional to the rate at which the conductor cuts the magnetic lines of force is:

- *a. Faraday's Law.
- b. electromagnetic induction.
- c. Lenz's Law.
- d. inductance.

The unit for measuring electrical charge is:

- a. ampere.
- *b. Coulomb.
- c. electron.
- d. current.

Performance Exam

- Administration Time: 4 hours
- Administration Method: Onsite at an approved Teacher Testing Location

Performance Exam Content Coverage

28% Fabrication

- Identify Resistor Values and Compute Tolerance Range Limits
- Measure Values Using a (D.M.M.)
- Determine Resistor Tolerance
- Perform IC Placement and Removal Procedures
- Draw a Schematic of a Given Circuit Board

36% Analog

- Construct an Amplifier Circuit to Design Specifications
- Construct a SCR Circuit
- Construct and Test a Power Supply
- Test Transistors

32% Digital

- Identify Gates
- Wire a Flip-Flop
- Interpret a Wave Form

4% Safety

Candidate-Supplied Materials Required for the Performance Exam

- Face mask (cotton face covering or respirator which fully cover the nose and mouth)
- Eye protection
- Industry-Approved Work Clothes
- Lighted or non-lighted magnifiers/reading glasses may be utilized for the fine detail work
- Calculator

Candidates will be evaluated on the following criteria:

- Ability to follow task procedures to manufacturer's specifications and industry standards.
- Appropriate selection of tools and equipment.
- Demonstration of work habits to industry standards.
- Result of completed tasks.
- Safety according to OSHA standards.

Note: No books or notes will be allowed. Cell phones are prohibited during the exam administration.

Onsite Performance Exam Requirements

- Candidate must practice social distancing and wear the appropriate face covering that covers the nose and mouth while at the exam site.
- Testing sites may have individual requirements based on location and the current guidance from the Center for Disease Control and Prevention (CDC).

Performance Exam Reference Materials (Reference Current Edition)

- **Safety Orientation** by NCCER (Pearson Prentice Hall) www.crafttraining.com
- **OSHA Regulations** www.osha.gov
 - [1910.1200 - Hazard Communication](#)
 - [1910 Subpart I - Personal Protective Equipment](#)