

Massachusetts Technical Teacher Testing Program

Telecommunications and Fiber Optics 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

5%	<i>Fundamentals of Safety and Health</i>
3%	<i>Industry Standards</i>
7%	<i>Low Voltage Wiring</i>
10%	<i>Cabling and Connectors</i>
10%	<i>Pre-Wiring</i>
18%	<i>Fundamentals of Electricity/Electronics</i>
10%	<i>Fundamentals of Telephony</i>
10%	<i>Fiber Optics Theory and Applications</i>
8%	<i>Principles of Electronic Communication</i>
10%	<i>Fundamentals of Wireless Communication</i>

7% Tools and Equipment

2% Troubleshooting Skills

Written Exam Reference Materials (Reference Current Edition)

- **The Essential Guide to Telecommunications** by Annabel Z. Dodd (Prentice Hall)
- **Telecom 101** by Eric C. Coll (Tecom Training Institute)
- **Introduction to Fiber Optics** by John Crisp and Barry Elliott (Newnes)
- **Fiber-Optic Communication Systems** by Govind P. Agrawal (Wiley)

References includes in the Massachusetts State Framework Standards for Telecommunications and Fiber Optics

- **Telephone Systems** by Robert Kellejian and T. Michael Bishoff (Heathkit)
- **Principles of Electronic Communication** (Heathkit)
- **Principles of Electric Circuits** by Thomas Floyd and David Buchla (Pearson)
- **Practical Fiber Optics** by David Bailey and Edwin Wright (Newnes)
- **Electronic System Technician** by NCCER (Pearson)
- **Digital Electronics** by Roger Tokheim (McGraw Hill)
- **Tools for Problem Solving** (Pearson)

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 copper cabling from the customer's premises to the Central Office is commonly known as the:

- a. demarc line.
- b. short haul line.
- *c. local loop.
- d. POTS.

Bluetooth wireless communications operates in the frequency range of:

- *a. 2.402 GHz to 2.480 GHz.
- b. 2.402 GHz to 2.580 GHz.
- c. 2.502 GHz to 2.580 GHz.
- d. 2.502 GHz to 2.680 GHz.

Performance Exam

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

Performance Exam Content Coverage

26% Principles of AC/DC and Measurements of Circuit Parameters

- Construct and Analyze a 555 Timer Circuit

39% Fiber Optics and Cabling

- Electronic Assembly
- Fiber Optic Preparation and Assembly
- Test and Troubleshoot a Transmitting (Receiving Fiber Optic Assembly)

26% Digital Electronics

- Developing Boolean Expressions
- Simplifying Boolean Expressions
- Generating a Circuit Drawing
- Breadboarding and Troubleshooting

9% Safety

Materials Required for the Performance Exam (Candidate Must Supply)

- Face mask (cotton face covering or respirator which fully cover the nose and mouth)
- Eye protection
- Disposable gloves
- Industry Approved Work Clothes and Boots/Shoes

Additional Equipment to be Provided by the Testing Site:

- Oscilloscope
- Power Supply
- Digital Circuit Trainers (or Breadboards)
- Miscellaneous Components (555, Resistors, Capacitors, Wires, Wire Cutters, Soldering Iron, etc.)

Candidates should become familiar with the following:

- The nature, operation, and application of a 555 timer
- Applying soldering techniques for electronic components
- Fiber optic termination techniques (plastic fibers)
- Using test equipment (DMM, power meters, oscilloscopes, etc.)
- Breadboarding techniques
- Applying Boolean algebra or K-mapping

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)

- **Digital Electronics** by Thomas L. Floyd (Pearson)
- **Telecommunications Essentials** by Lillian Goleniewski (Addison-Wesley)
- **The Essential Guide to Telecommunications** by Annabel Z. Dodd (Prentice Hall)
- **Telecom 101** by Eric C. Coll (Teracom Training Institute)
- **Introduction to Fiber Optics** by John Crisp and Elliott Barry (Newnes)
- **Fiber Optic Communication Systems** by Govind P. Asgawal (Wiley)
- **Telephone Systems** by Robert Kellejian and T. Michael Bishoff (Heathkit)
- **Principles of Electronic Communication** (Heathkit)
- **Principles of Electric Circuits** by Thomas Floyd and David Buchla (Pearson)
- **Practical Fiber Optics** by David Bailey and Edwin Wright (Newnes)
- **Electronic System Technician** by NCCER (Pearson)
- **Digital Electronics** by Roger Tokheim (McGraw Hill)
- **Tools for Problem Solving** (Pearson)
- **You Tube Video:**
 - **Fiber Optic Termination: Part 1 – Part 5** by FOA, Inc.
- **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](#)