

## Standards and Test Content General Electronics Technician

### Demonstrate Proper Procedures and Practices for Safety in the Work Area (2 questions)

1. Identify and practice mechanical safety
  - Tool safety
  - Hand safety
  - Eye safety
2. Immediately report injuries/accidents following company procedures
3. Identify and practice electrical safety
4. Participate in “Right to Know” training and practice environmental safety
  - Chemical awareness
  - Environmental regulations
  - Gases and pressure safety
5. Identify and practice safety related to infectious disease, universal precautions, blood-borne pathogens, and chemical hygiene
6. Identify and practice thermal safety
7. Identify and practice radiation safety
8. Demonstrate and practice traffic and vehicle safety
9. Identify and practice laser safety
10. Demonstrate knowledge of lock-out/tag-out requirements and danger associated with potential energy sources
11. Identify and practice fiber optic handling safety
12. Perform a leakage check on electronic equipment
13. Test electrical equipment to ensure proper grounding
14. Identify sources of hazardous noise



### Demonstrate Employability Skills (2 questions)

1. Maintain a courteous and responsible attitude toward all customers
2. Demonstrate appropriate interpersonal skills
3. Maintain self-esteem in self and others
  - Analyze personal space and needs
  - Interpret emotional reactions
  - Determine values scale and attitudes
  - Cope with change
  - Interpret sensory clues

4. Recognize the importance of teamwork and participate as a team member

- Participate in team (group) meetings
  - Focus on topic and purpose of the meeting
  - Offer facts and ideas
  - Help others contribute facts and ideas
- Pass on good ideas
- Look for ways to help others
- Give recognition for things well done
- Let others know what you need to get the job done



5. Maintain professional respect for supervisor and co-workers

6. Use professionalism

- Follow facility dress code
- Exhibit positive attitude
- Exhibit initiative
- Exhibit loyalty
- Exhibit respect to others
- Exhibit flexibility
- Exhibit commitment
- Practice hygiene

7. Use critical thinking skills in workplace situations

- Distinguish appropriateness of equipment and tests
- Decision making
- Creativity
- Use quality performance processes
- Use tools to analyze information
  - Use basic statistical concepts and analysis
  - Create charts
  - Create histograms
  - Create flow charts
- Use quality tools
- Evaluate stressful situations
- Evaluate how to manage ethical conflicts

8. Maintain satisfactory attendance

- Punctuality
- Tardiness
- Early departure
- Absence
- Calling in

9. Use stress management techniques

10. Function within the organizational structure

- Chain of command
- Amount of empowerment

11. Distinguish the departments within the organization

12. Distinguish the roles of the organizational members

13. Use self-management and time management techniques

- Independence
- Self-evaluation
- Leadership skills
- Supervision
- Delegation
- Organization
- Prioritization
- Initiative

14. Use deductive and inductive reasoning skills

15. Use proper telephone etiquette

- Project positive telephone image
- Manage incoming telephone calls
  - Receive incoming calls
  - Screen incoming calls
  - Transfer incoming calls when indicated
  - Manage multiple incoming calls
  - Use telephone log or computerized system
- Manage telephone calls
  - Inquiries
- Manage telephone calls involving special problems
  - Unidentified callers
  - Angry callers
  - Calls from family and friends
- Manage telephone calls involving medical emergencies
- Record and deliver telephone calls
  - Local
  - Long distance
  - Conference
- Use special features if available
- Identify factors that relate to a global business environment
  - Time zones
  - International dialing codes
- Use telephone directories
  - Evaluate types and organization of each type
  - Use telephone assistance and information
  - Maintain company directory



16. Employ listening skills

- Show interest
- Ask questions and clarify what has been heard
- Let person know what you understand

17. Compose written communication legibly using correct grammar, spelling, and format

- Compose questions
- Compose consent forms
- Compose student evaluation reports
- Select and use appropriate format for written communication
- Use reference materials as appropriate
- Use proper grammatical techniques
  - Abbreviate for words used in addresses, measurements, months and days of the year
  - Use proper punctuation

18. Interpret and follow written directions and information

19. Interpret and follow oral directions

20. Use job-related terminology, symbols, and abbreviations

21. Use basic keyboarding skills and computer skills
  - E-mail
  - File transfer protocol (FTP)
  - Internet
  - Operating System
  - Office Suite Products
22. Use effective communication techniques with peers, co-workers, and customers
  - Pronounce words correctly
23. Use verbal and non-verbal communication techniques
24. Apply behavioral management techniques to workplace situations
  - Use personal coping skills
  - Deal with customers and co-worker attitudes
  - Exhibit a sense of humor
  - Use positive feedback techniques
    - Emphasize strengths
  - Use negative feedback techniques
    - Stress main points the person could do differently
25. Identify personal and work-related goals and monitor progress
  - Chart and set long, medium, and short term goals
  - Determine educational needs
  - Set professional goals
  - Set personal goals
26. Respond to compliments, complaints, conflicts, and criticism appropriately
27. Compile research data
28. Apply electronics-related mathematical concepts
  - Addition, subtraction, multiplication, and division of:
    - Whole numbers
    - Fractions
    - Decimals
    - Percentages
    - Binary mathematics
    - Hexadecimal mathematics
  - Exponents
  - Scientific notations
  - Significant digits
  - Basic trigonometry functions
  - Measurements
    - U.S. to metric
    - Metric to U.S.
  - Use of calculator
  - Concept of coins and currency
  - Estimation
  - Reading charts, graphs, and tables
  - Basic geometry
  - Application of formulas
    - Word problems
    - Thought problems



29. Use negotiation skills

- Interpret how to reasonably disagree
- Interpret ways to overcome objections
- Solve everyday human relation problems

30. Use career development skills

- Write cover/application letter
- Complete job application
- Interpret Form W-2
- Write a job description
- Investigate an occupation
- Explore career opportunities
- Compare career options
- Develop a personal career plan
- Negotiate salary and benefits

31. Use multi-cultural sensitivity skills

- Recognize and respect diverse customs and accommodate them in the work environment

32. Understand anti-discriminatory laws and take steps to comply with laws relating to:

- Gender
- Race
- Disability
- Age
- Religion
- National origin
- Color

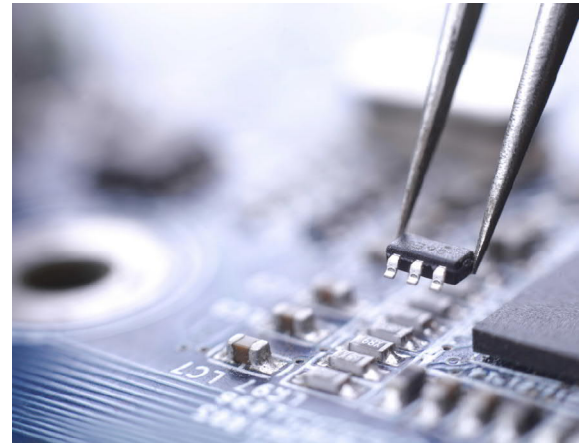
## **Identify and Demonstrate Proper Use of Industry-Specific Tools and Test Equipment (1 question)**

1. Demonstrate proper use of occupationally-specific tools
2. Identify automated testing equipment and methods of using test circuits and systems
3. Use appropriate instrumentation to test ESD protective systems

## **Identify and Demonstrate Proper Use of Common Tools and Test Equipment (7 questions)**

1. Use an analog multimeter to measure:
  - Voltage
  - Current
  - Resistance
2. Use a digital multimeter to measure:
  - Voltage
  - Current
  - Resistance
3. Use an oscilloscope to measure AC, DC, and time-based waveforms
4. Use a function/signal generator to simulate necessary signals
5. Use frequency counters to measure frequencies and period
6. Use a digital storage oscilloscope to capture and display specialized waveforms
7. Use a logic probe to analyze logic circuits

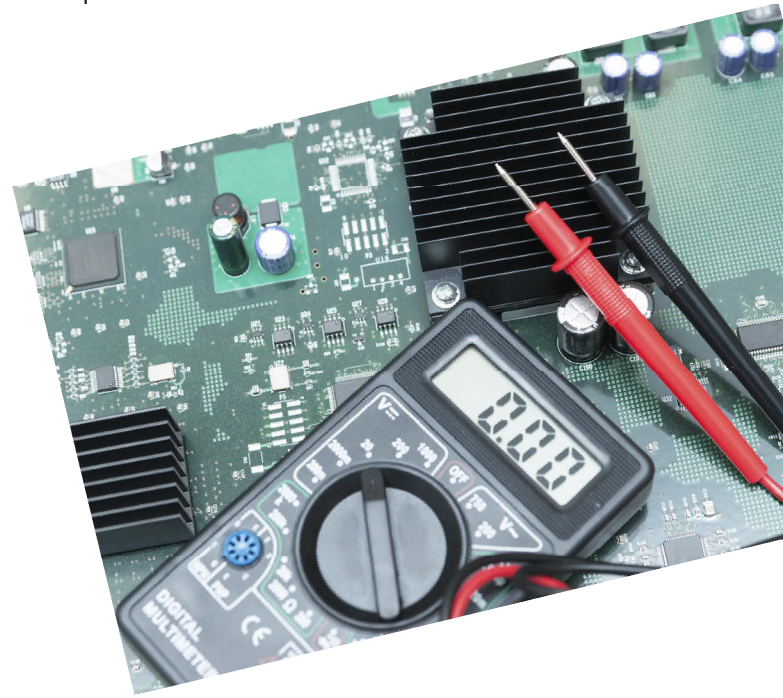
8. Use capacitor/inductor analyzer to test passive circuit elements
9. Use a pulse injector to insert pulses into digital circuitry
10. Use variac
11. Use isolation transformer
12. Use DC power supply
13. Use an AC circuit polarity tester
14. Use an electrical resistance insulation tester (megger)
15. Demonstrate proper care and use of precision measuring tools and instruments
16. Use clamp on meters (volt or amp)
17. Perform metric and standard mechanical measurements
18. Demonstrate proper use of hand tools
19. Demonstrate proper use of power tools



### **Identify Components, Establish Their Value or Parameters Using Common Reference Material and Color Codes, and Test for Proper Function (12 questions)**

1. Distinguish between conductors and insulators –basic materials
2. Identify types of cells and batteries and demonstrate proper storage and handling procedures
3. Identify the types and applications of connectors
4. Identify the types and applications of lamps
5. Identify parts and functions of motors and generators
6. Identify functions of solenoids, relays, and switches
7. Determine resistor values by color code and size
8. Identify diode types and parameters by color codes and/or markings
9. Identify types of transistors and their parameters
10. Identify types of thyristors and their parameters
11. Identify integrated circuit families
12. Identify synchro, servo, and stepper motors, associated components, characteristics, and operations
13. Identify and test circuit protection devices
14. Demonstrate proper handling of static-sensitive devices
15. Identify types and applications of various photo-sensitive devices
16. Determine capacitor values
17. Determine inductor values
18. Identify transformer ratings and lead configurations by color codes and/or markings
19. Identify types of antenna systems and their use

20. Identify and test basic electron tubes
21. Identify and test types and applications of various temperature sensitive devices
22. Test conductors and insulators
23. Test cells and batteries
24. Test connectors
25. Test lamps
26. Test motors and generators
27. Test solenoids, relays, and switches
28. Test resistors
29. Test diodes
30. Test transistors
31. Test thyristors
32. Test integrated circuits
33. Test, synro, servo, and stepper motors
34. Test various photo-sensitive devices
35. Test capacitors
36. Test inductors
37. Test transformers
38. Test antenna systems
39. Identify types/sizes of wire and cable and appropriate applications



### **Demonstrate Proper Soldering and Desoldering Procedures (1 question)**

1. Perform standard soldering and desoldering techniques
2. Perform hot air soldering and desoldering techniques
3. Identify multi-layer boards and demonstrate knowledge of procedural differences
4. Perform surface-mount soldering and desoldering techniques
5. Perform high and low temp soldering

### **Read and Interpret Schematics, Diagrams, and Blueprints (3 questions)**

1. Identify and use common notations and symbols
2. Use schematics, diagrams, and blueprints to locate and identify specific equipment within areas
3. Use schematics, diagrams, and blueprints to interface subassemblies/peripherals
4. Trace signal/power flow

5. Recognize proper waveforms
6. Use schematics, diagrams, and blueprints to construct/assemble equipment
7. Maintain service documentation library/Internet file

## **Interpret and Apply Industry-Specific Codes and Regulations (1 question)**

1. Research and apply appropriate codes and regulations

## **Evaluate Direct Current Circuits (7 questions)**

1. Solve basic algebraic problems as applicable to electronics
2. Relate electricity to nature of matter
3. Identify sources of electricity
  - Chemical
  - Mechanical
  - Thermal
  - Tibro (static)
  - Piezo
  - Photo voltaic
4. Define voltage, current, resistance, power, and energy
5. Apply and relate Ohms Law
6. Measure properties of a circuit using VOM and DVM meters
7. Compute and measure conductance and resistance of conductors and insulators
8. Analyze, construct, and troubleshoot series circuits, parallel circuits, series-parallel circuits, and voltage dividers
9. Define magnetic properties of circuits and devices
10. Apply logical and systematic approach to troubleshooting DC circuits
11. Solve network theorem problems using Kirchhoff, Thevenin, Norton, and Superposition
12. Analyze and measure RL and RC time constants

## **Evaluate Alternating Current Circuits (6 questions)**

1. Identify properties of an AC signal
2. Identify AC sources
3. Set up and operate test equipment for AC circuits
4. Analyze and measure AC signals using proper test equipment
5. Analyze and apply principles in transformers to AC circuits
6. Apply logical and systematic approach to troubleshooting AC circuits
7. Analyze basic motor theory and operation
8. Identify and configure Delta and Wye configurations



9. Analyze basic generator theory and operation
10. Solve basic trigonometric problems as applicable to electronics
11. Construct, analyze, and troubleshoot AC capacitive circuits, AC inductive circuits, RLC circuits (series, parallel, complex) series and parallel resonant circuits, filter circuits, and polyphase circuits
12. Analyze, construct, and troubleshoot maximum power transfer theory

### **Evaluate Common Semi-Conductor Devices (3 questions)**

1. Identify properties of semi-conductor materials
2. Analyze and measure characteristic of P-N junction diodes
3. Analyze and measure characteristics of special diodes
4. Analyze, construct, and troubleshoot diode circuits
5. Identify, define, and measure characteristics of unipolar and bipolar devices, thyristors, and integrated circuits
6. Apply logical and systematic approach to troubleshooting semi-conductor devices
7. Set up and operate test equipment for solid state devices

### **Evaluate Analog Circuit Devices (7 questions)**

1. Analyze, construct, and troubleshoot single stage amplifiers
2. Analyze, construct, and troubleshoot multi-stage amplifiers
3. Analyze, construct, and troubleshoot operational amplifiers
4. Analyze, construct, and troubleshoot basic power supplies and filters
5. Analyze, construct, and troubleshoot oscillators
6. Analyze motor or phase control circuits
7. Apply logical and systematic approach to troubleshooting analog circuit devices
8. Analyze, construct, and troubleshoot power supply regulators
9. Analyze, construct, and troubleshoot active filters
10. Set-up and operate test equipment for analog circuits
11. Troubleshoot switching power supplies
12. Analyze and troubleshoot phase-locked-loop systems



### **Evaluate Digital Logic Devices (4 questions)**

1. Define and apply number systems to codes and arithmetic operations
2. Analyze, construct, and troubleshoot logic gates, logic arithmetic circuits, flip-flops, and encoders and decoders

3. Analyze, construct, and troubleshoot registers and counters, clock and timing circuits, multiplexers and demultiplexers, digital to analog and analog to digital devices, and discrete input/output circuits
4. Analyze, construct, and troubleshoot displays and representative digital systems
5. Apply logical and systematic approach to troubleshooting digital logic devices
6. Set-up and operate test equipment for digital devices

### **Evaluate Microprocessor Systems (1 question)**

1. Analyze and troubleshoot processors
2. Analyze and troubleshoot memory systems
3. Analyze and troubleshoot input/output systems
4. Apply logical and systematic approach to troubleshooting microprocessor systems
5. Analyze and troubleshoot bus systems, protocols, and timing schemes
6. Execute computer instruction sets
7. Demonstrate proper use of system diagnostics

### **Evaluate Communications Techniques and Equipment (1 question)**

1. Test and troubleshoot AM circuits
2. Test and troubleshoot FM circuits
3. Test and troubleshoot specialized analog and digital communications techniques (various pulse modulations, modem, faxes)

### **Generate Technical Documentation (2 questions)**

1. Prepare customer documents used for removal, repair, and reinstallation of an electronic system or component
2. Prepare typical work orders, logbooks, and historical records
3. Perform proper and complete documentation of maintenance and repair actions
4. Research and order parts
5. Demonstrate the ability to properly document engineering changes or field modifications
6. Calculate and prepare a customer billing document
7. Complete work order using electronic documentation