IGNITE YOUR POTENTIAL 2024-2025

NYS SkillsUSA Standards

ELECTRONICS TECHNOLOGY

PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of electronics technology.

ELIGIBILITY

Open to active NYS SkillsUSA members enrolled in programs with industrial electronics or electronics technology as the occupational objective.

CLOTHING REQUIREMENTS

NYS SkillsUSA Business Professional

- White polo shirt (plain or with SkillsUSA or SkillsUSA NY monogram) or White dress shirt with
- plain black tie with no pattern or a SkillsUSA black tie, or business like white collarless blouse or white blouse with small plain collar.
- Black dress slacks (accompanied by black dress socks or black or skin-tone seamless hose) or black dress skirt (knee-length, accompanied by black or skin-tone seamless hose).
- Black leather shoes that are not backless or open toe

Note: **Contestants must wear their contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, and safety assurance form.**

EQUIPMENT AND MATERIALS

1. Supplied by the NY chair / committee:
   a. All materials, supplies and job information are needed to construct and test the designed circuit.
   b. The technical committee will not supply tools, test equipment or calculators.
2. Supplied by the competitor:
   a. Small needle nose pliers
   b. Wire cutter (Flush cutter)
   c. Wire stripper for small gauge wire. For No. 28 and No. 30 gauge wire
   d. Small, assorted screwdriver set (Phillips and slotted)
   e. 25-watt soldering iron and associated soldering supplies (***Note***: No soldering guns allowed)
   f. Other hand tools as desired, subject to the approval of the technical committee
   g. Digital multimeter capable of measuring ohms, volts
   h. A 20 (or more) MHz Oscilloscope with probe
   i. Calculator (can have Engineering notation and 1/X functions, but **cannot** be programmable)
   j. DC power supply – (variable if possible) capable of 12 VDC
   k. Minimum of 4 mini clips to mini clip cables (mini-Alligator clip leads)
   l. Test leads for the above pieces of equipment
   m. All competitors must create a one-page resume. See "Resume Requirement" below for guidelines.

RESUME REQUIREMENT

Competitors must create a one-page resume to submit at orientation.

DEVICES

Cell phones or other electronic devices not approved by the NYS Chairperson will be collected by the contest chair during the competition. Chairpersons will announce their acceptance by listing it on their standard or at the orientation meeting. In case of emergencies advisors should allow the competitors to take their phones to the contest areas.

If the competitor uses their device in a manner which compromises the integrity of the competition, the competitor's score may be penalized.

SCOPE OF THE COMPETITION

The competition will assess the ability to apply theoretical and practical knowledge of state-of-the-art electronic industry standards as determined by the International Society of Certified Electronics Technicians. Additionally, the competition also requires competitor proficiency of competencies listed by the National Coalition for Electronics Education — Basic Electronics. Competitors will demonstrate their ability to perform jobs or skills from the following list of competencies as determined by the SkillsUSA Championships technical committee, which includes NIDA Corporation Changes may occur as needs or standards are updated. Any modifications and or changes will be posted to the SkillsUSA website.

KNOWLEDGE PERFORMANCE

All competitors are required to take the SkillsUSA professional development test at orientation.

The competition includes two written knowledge tests: a certified electronics technician exam and a customer service test. The exam is an industry-standard written test. This may change as needs or standards are updated. If there is a need to revise the exam, the change will be posted on the SkillsUSA website.

SKILL PERFORMANCE

The skill performance portion of the competition will include circuit construction, soldering and circuit/system troubleshooting. Competitors will read and follow instructions, interpret circuit design drawings, analyze, and identify circuit faults, solder various electronic components, and properly use electronic components in accordance with their design specifications.

COMPETITION GUIDELINES

1. Competitors will be provided with the characteristics, parameters, and information to accomplish the assigned tasks.
2. Time limit:
   a. Competitors will begin upon a signal from the timekeeper.
   b. As soon as competitors have completed the assignment and are fully satisfied with the operation and quality of their work, they will signal the judge and stop their work. This signal will determine elapsed time and speed.
3. The completed projects will be tested by the judges for quality of work and operating specifications.

STANDARDS AND COMPETENCIES

ET 1.0 — Interpret, record, and report technical data from provided materials to related ISCET standards

1.1. Draw and interpret electronic schematics
1.2. Record data and design curves and graphs
1.3. Write reports
1.4. Maintain test logs
1.5. Make equipment failure reports
1.6. Specify and requisition simple electronic components

1.7. Compose technical letters
1.8. Write formal reports of laboratory experiences

ET 2.0 — Apply knowledge of DC circuits to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

2.1. Solve basic algebraic problems as applicable to electronics
2.2. Relate electricity to nature of matter
2.3. Identify sources of electricity
2.4. Define voltage, current, resistance, power, and energy
2.5. Apply and relate Ohm's Law
2.6. Read and interpret color codes to identify resistors
2.7. Measure properties of a circuit using VOM and DVM meters
2.8. Compute and measure conductance and resistance of conductors and insulators
2.9. Analyze, construct, and troubleshoot series circuits, parallel circuits, series-parallel circuits, and voltage dividers
2.10. Solve network theorem problems using Kirchhoff, Thevenin, Norton, Superposition and Delta-Wye
2.11. Analyze, construct, and troubleshoot maximum power transfer theory
2.12. Define magnetic properties of circuits and devices
2.13. Determine physical and electrical characteristics of capacitors and inductors
2.14. Analyze and measure RL and RC time constants
2.15. Set up and operate a VOM, DVM, power supplies and oscilloscopes for DC circuits

ET 3.0 — Apply knowledge of AC circuits to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

3.1. Solve basic trigonometric problems as applicable to electronics (prerequisite to AC)
3.2. Identify properties of an AC signal
3.3. Identify AC sources
3.4. Analyze and measure AC signals using oscilloscope, frequency meters and generators
3.5. Analyze, construct, and troubleshoot AC capacitive circuits, AC inductive circuits, RLC circuits (Series, Parallel, Complex) series and parallel resonant circuits, filter circuits and polyphase circuits
3.6. Analyze basic motor theory and operation
3.7. Analyze basic generator theory and operation
3.8. Set up and operate VOM, DVM and power supplies for AC circuits
3.9. Set up and operate oscilloscopes, frequency counters, signal generators, capacitor-inductor analyzers and impedance bridges for AC circuits
3.10. Analyze and apply principles of transformers to AC circuits

ET 4.0 — Apply knowledge of solid-state devices to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

4.1. Identify properties of semiconductor materials
4.2. Analyze and measure characteristics of P-N junction diodes
4.3. Analyze and measure characteristics of special diodes
4.4. Analyze, construct, and troubleshoot diode circuits

4.5. Identify, define, and measure characteristics of bipolar transistors, thyristors, and integrated circuits
4.6. Set up and operate VOM, DVM and power supplies for solid state devices
4.7. Set up and operate oscilloscopes, frequency counters, signal generators, capacitor-inductor analyzers and impedance bridges for solid state devices
4.8. Set up and operate curve tracers and transistor testers

ET 5.0 — Apply knowledge of analog circuits to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

5.1. Analyze, construct, and troubleshoot single-stage amplifiers, multi-state amplifiers, basic power supplies and filters, power supply regulators, active filters, and oscillators
5.2. Analyze motor or phase control circuits
5.3. Set up and operate VOM, DVM and power supplies for analog circuits
5.4. Set up and operate oscilloscopes, frequency counters, signal generators, and capacitor-inductor analyzers for analog circuits
5.5. Set up and operate impedance bridges for analog circuits
5.6. Set up and operate recorders for analog circuits

ET 6.0 — Apply knowledge of digital devices to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

6.1. Define and apply number systems to codes and arithmetic
6.2. Analyze, construct, and troubleshoot logic gates, logic arithmetic circuits, flip-flops, and encoders and decoders
6.3. Identify, define, and measure characteristics of IC logic families
6.4. Analyze, construct, and troubleshoot registers and counters, clock and timing circuits, multiplexers and demultiplexers, digital to analog, and analog to digital
6.5. Analyze, construct, and troubleshoot displays and representative digital systems
6.6. Set up and operate VOM, DVM and logic probes for digital devices
6.7. Set up and operate power supplies, pulsers, oscilloscopes, logic analyzers, signature analyzers, pulse generators, and counters for digital devices

ET 7.0 — Apply knowledge of microprocessors to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

7.1. Analyze, construct, and troubleshoot CPUs, BUS systems, memory systems and input/output ports, microprocessor applications and systems
7.2. Execute computer instruction sets
7.3. Analyze and troubleshoot microprocessor systems
7.4. Set up and operate VOM, DVM, power supplies, pulsers, oscilloscopes, logic/data analyzers, signature analyzers, pulse generators, and counters for micro processing

ET 8.0 — Use laboratory practices common to industry situation

8.1. Demonstrate proper OSHA-related safety standards
8.2. Make electrical connections
8.3. Identify and use hand and power tools used in electronics technology
8.4. Utilize standard troubleshooting procedures for defective circuits