



# ELECTRICAL APPLICATIONS (HS)

To participate in this event, bring a standard calculator and your basic knowledge of electrical theory.

The Electrical Applications written test is comprised of a variety of questions about electrical and electronic theory. A Google search might help you zero in on the kind of content to expect on the test. Here's just one source:  
<http://www.elexp.com/tips.htm>

## OVERVIEW

Through a written test, the participant demonstrates knowledge of basic electrical and electronic theory, as well as the use of a multimeter. Semifinalists are given a circuit to assemble on site.

## CHALLENGE

Exhibit knowledge of basic electrical and electronic theory by taking a written test to qualify as a Semifinalist. Semifinalists assemble a specific circuit from a schematic diagram using a provided kit and make required electrical measurements. Semifinalists explain their solution during an interview.

## ELIGIBILITY

Participants are limited to two (2) individuals per chapter.

## TIME LIMITS

- A. Participants are allowed one (1) hour to complete the written test.
- B. Semifinalists are allowed one (1) hour to solve the circuit problem. Upon completion of the circuit or at the end of the time limit, Semifinalists are questioned about their solution in an interview.

## ATTIRE

Casual TSA attire as described in Competitive Events Attire is the minimum requirement.

## PROCEDURE

- A. Participants report to the event area at the time and place stated in the conference program.
- B. Participants complete the test within the time limit.
- C. Tests are scored. A semifinalist list in random order is posted.

- D. Semifinalists report to the event area at the time stated in the conference program.
- E. Semifinalists complete the circuit problem within the time limit using the provided kit.
- F. Semifinalists are interviewed by the evaluators.

## **REGULATIONS**

- A. An answer sheet (scan-type), paper, and pencil are furnished to the participant at the test site.
- B. Semifinalists provide their own standard calculator (no scientific calculators) and a battery-operated multimeter. All other equipment necessary to solve the on-site problem is provided by the coordinator.
- C. Semifinalists remain with their circuit solution until the evaluators have completed the interview.

## **EVALUATION**

Evaluation is based on points earned for the test, the accuracy and degree of completion of the circuit problem in the allotted time, and the interview.

# ELECTRICAL APPLICATIONS EVENT COORDINATOR INSTRUCTIONS

## PERSONNEL

- A. Event coordinator
- B. Three (3) event evaluators
- C. Two (2) assistants

## MATERIALS

### **A. Coordinator's notebook, containing**

- 1. Event guidelines, one (1) each for coordinator and evaluators
- 2. Official rating forms
- 3. List of entries with Semifinalist report
- 4. List of evaluators/assistants
- 5. Written test and answer sheet, a copy for each participant
- 6. Semifinalist list for posting
- 7. On-site Semifinalist problem, ten (10) copies
- 8. Results envelope

### **B. Ten (10) basic electricity Semifinalist kits containing:**

- 1. (Minimum) 1.375" x 3.25" solderless circuit breadboard 10 x 30 pin positions
- 2. One (1) 9-volt battery with snap-on battery connector
- 3. One (1) 9-volt battery clip
- 4. One (1) speaker (wires pre-soldered)
- 5. Two (2) LEDs
- 6. Ten (10) connector wires
- 7. Pushbutton switch (wires pre-soldered)
- 8. One (1) photocell
- 9. One (1) potentiometer (wires pre-soldered)
- 10. One (1) IN4003 diode
- 11. One (1) IC555 integrated circuit
- 12. One (1) 2N3906 transistor
- 13. One (1) 2N3904 transistor
- 14. Resistors [minimum of one (1) each, ohms]: 10, 10K, 47, 100, 220, 1K, 2.2K, 3.3K, 6.8K, 16K, 33K, 120K, 330, 470K
- 15. Capacitors (in microfarads): .01, .1, 10, 100, 1000
- 16. S106B1 SCR

### **C. Ten (10) wire strippers**

### **D. Ten (10) schematic copies of the circuit problem**

## RESPONSIBILITIES

- A.** Upon arrival at the conference, report to the Conference HQ room and check the contents of the coordinator's notebook. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.
- B.** Inspect the area or room in which the event is to be held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
- C.** One (1) hour before the event is scheduled to begin, meet with your evaluators/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.
- D.** Begin the event at the scheduled time by closing the doors and checking the entry list. All participants and evaluators should be in the room at this time. In order to compete, participants must be on the entry list or must have approval of the GA TSA State Director or State Advisor.
- E.** Monitor the one (1) hour written test.
- F.** For participants who violate the rules, the decision either to deduct twenty percent (20%) of the total possible points or disqualify the entry must be discussed and verified with the evaluators, event coordinator, and an Advisory Council manager. Secure the initials of the coordinator and manager on the rating form.
- G.** Prepare a list of the ten (10) Semifinalists and submit it to the GA TSA State Director for posting.
- H.** Provide kits and the on-site circuit problem to the Semifinalists.
- I.** Supervise the one (1) hour on-site circuit problem.
- J.** Evaluators conduct interviews in an area away from the other Semifinalists.
- K.** Any ties should be broken on: 1st-test scores; 2nd-interview points; 3rd-electronic measurement accuracy.
- L.** Secure the evaluators' signatures on their rating forms. Through the discussion process, the evaluators break any ties that affect the top three (3) placements.
- M.** Submit the Semifinalist report, including a ranking of the ten (10) Semifinalists, and all related forms in the results envelope to the Conference HQ room.
- N.** Manage security and the removal of materials from the event area. Collect, disassemble and return all kits to the Conference HQ room.

## STEM INTEGRATION

This event has connections to the STEM areas noted below. Please refer to the STEM INTEGRATION section of the National TSA Events Guide

Science, Technology, Engineering, Mathematics

## LEADERSHIP SKILLS

Leadership skills promoted in this event:

- **Critical Thinking:** Students research and study electronics and electrical theory. Use leadership lessons: *The Reporter* and *Pros and Cons*
- **Evaluation:** Students adapt the solution as the event progresses. Use leadership lessons: *Exhaustive Evaluation* and *Evaluation of the Experts*
- **Problem Solving:** Students apply knowledge while solving an on-site electrical problem. Use leadership lessons: *The Vision* and *Leaning Tower of....*

Additional leadership skills promoted in this event:

- Creative Thinking

## TSA AND CAREERS

This competition has connections to one or more of the career areas featured in the TSA AND CAREERS section of this guide. Use *The 16 Career Clusters* chart and the *TSA Competitions and Career Clusters* grid as resources for information about careers.

## CAREERS RELATED TO THIS EVENT

Electrical engineer  
Electrician  
Electronic analyst  
Electronic designer  
Research assistant