

Study Guide for Apprentice Electrician, Third Step

Test No. 2828

Form A and B

**Human Resources
Performance Assessment Services
Southern California Edison
An Edison International Company**

REV 080200

Introduction

The Apprentice Electrician Third Step test is a job knowledge test designed to cover the major knowledges necessary to perform the job. This *Guide* contains strategies to use for taking tests and a study outline, which includes knowledge categories, major job activities, and study references.

Test Scheduling

Employees will be scheduled for testing by their Supervisor through Human Resources. Applicants will be scheduled through the recruiter. If you do not pass the test on your first attempt, please refer to the testing guidelines on MyEdison.Net (employees only) or call 626-302-9830.

Test Session

It is important that you follow the directions of the Test Administrator *exactly*. If you have any questions about the testing session, be sure to ask the Test Administrator before the testing begins. During testing, you may not leave the room, talk, smoke, eat, or drink. Since some tests take several hours, you should consider these factors before the test begins.

All questions on this test are multiple-choice with four possible answers. Your answers to the questions are indicated by filling in a circle on an answer sheet with a special mark-sense pencil. For your answers to be read accurately by the scanner, you must fill in the circles completely and erase completely any answer you wish to change.

The test has a three hour time limit, and you may use a non-programmable calculator.

You will receive a Test Comment form so that you can make comments about test questions. Write any comments you have and turn it in with your test when you are done.

Study Guide Feedback

At the end of this *Guide* you have been provided with a Study Guide Feedback page. If a procedure or policy has changed, making any part of this *Guide* incorrect, your feedback would be appreciated so that corrections can be made.

Test Taking Strategies

Introduction

The Apprentice Electrician Third Step test contains multiple-choice questions. The purpose of this section is to help you to identify some special features of a multiple-choice test and to suggest techniques for you to use when taking one.

Your emotional and physical state during the test may determine whether you are prepared to do your best. The following list provides common sense techniques you can use before the test begins.

Technique

Remarks

Be confident

- If you feel confident about passing the test, you may lose some of your anxiety.
- Think of the test as a way of demonstrating how much you know, the skills you can apply, the problems you can solve, and your good judgment capabilities.

Be punctual

- Arrive early enough to feel relaxed and comfortable before the test begins.

Concentrate

- Try to block out all distractions and concentrate only on the test. You will not only finish faster but you will reduce your chances of making careless mistakes.
- If possible, select a seat away from others who might be distracting.
- If lighting in the room is poor, sit under a light fixture.
- If the test room becomes noisy or there are other distractions or irregularities, mention them to the Test Administrator *immediately*.

Budget your time

- Pace yourself carefully to ensure that you will have enough time to complete all items and review your answers.

Read critically

- Read all directions and questions carefully.
- Even though the first or second answer choice looks good, be sure to read all the choices before selecting your answer.

Make educated guesses

- Make an educated guess if you do not know the answer or if you are unsure of it.

Changing answers

- If you need to change an answer, be sure to erase your previous answer completely.

Return to difficult questions

- If particular questions seem difficult to understand, make a note of them, continue with the test and return to them later.

Double-check mathematical calculations

- Use scratch paper to double check your mathematical calculations.

Review

- If time permits, review your answers.
- Do the questions you skipped previously.
- Make sure each answer bubble is *completely* filled in. Erase any stray marks on your answer sheet.

Remember the techniques described in this section are only suggestions. You should follow the test taking methods that work best for you.

Study Guide Outline

Job Knowledge Categories

Below are the major job knowledge categories that are covered on the test.

A. Maintenance and Transformer Maintenance

- Fans and pumps
- Oil, gas and oxygen tests
- Power fuses

B. Insulator Bushing, Disconnect Maintenance and Insulator Washing

- Water testing
- Washing procedures
- Cold meggering
- Ductoring connections
- Adjusting and maintaining disconnects

C. Test Instruments, Hand Tools and Principles of Electrical Wiring

- Multimeter
- Microhmeter
- Oil test set
- Megger
- Hi-pot set
- Cincinnati timer
- Hygrometer
- Computer timers, and RTR-84.
- Fyrite
- Explosimeter
- Tool requirements
- Working knowledge of hand tools
- Calculation of wire size, conduit size and of load and amp capacities

D. Circuit Breaker Maintenance

- Trip tests
- Overhauls
- History cards
- Equipment trouble reports
- Oil, gas and air handling
- Rating and types of circuit breakers
- Arc interruption
- Circuit breaker timing
- DC circuits
- Ditty stock
- Pipe sizes and fittings
- Wire sizes and types

E. Operating Procedures and Equipment

- Logging
- Equipment nomenclature
- Secondary switches
- Routine and emergency operating
- Relays
- Operating practices

F. Safety and Vehicles

- Trailer towing
- Insulator wash truck
- CPR
- Electric and traumatic shock
- Burns, bleeding; first aid kit contents
- Clearance procedures
- Personal grounds
- Safe work practices
- Fire prevention and protection
- Checker responsibilities
- Safe working distances
- Safety equipment
- PCB clean-up

Job Activity Groups

Below are the major job activity groups that are covered on the test.

- ACTIVITY GROUP 1 - SAFETY/FIRST AID PRACTICES AND PROCEDURES**
- ACTIVITY GROUP 2 - VEHICLES**
- ACTIVITY GROUP 3 - TEST INSTRUMENTS AND PROCEDURES**
- ACTIVITY GROUP 4 - OPERATING PROCEDURES AND EQUIPMENT**
- ACTIVITY GROUP 5 - INSULATOR WASHING PROCEDURES AND EQUIPMENT**
- ACTIVITY GROUP 6 - CIRCUIT BREAKER MAINTENANCE AND EQUIPMENT**
- ACTIVITY GROUP 7 - TRANSFORMER MAINTENANCE AND EQUIPMENT**
- ACTIVITY GROUP 8 - ELECTRICAL WIRING PROCEDURES AND MATERIALS**
- ACTIVITY GROUP 9 - INSULATOR, BUSHING AND DISCONNECT MAINTENANCE AND EQUIPMENT**
- ACTIVITY GROUP 10 - HAND TOOLS**

Study References

Below is a combined listing of the study references for material covered on the test. The materials listed in this Guide are available from general company references (e.g. ESM, Accident Prevention Manual, etc.), public/university libraries, general bookstores, university or technical bookstores. Department reference material (e.g., Operating letters, on-line computer systems, etc.) again will depend on project. They also are available from the instructors at the Substation Training School in Alhambra, (626) 308-6566, PAX 46566.

KNOWLEDGE CATEGORY A - MAINTENANCE AND TRANSFORMER MAINTENANCE

BASED UPON ACCUMULATED JOB KNOWLEDGE GAINED IN PREVIOUS STEP LEVEL JOB PERFORMANCE.

KNOWLEDGE CATEGORY B - INSULATOR BUSHING, DISCONNECT MAINTENANCE AND INSULATOR WASHING

BASED UPON ACCUMULATED JOB KNOWLEDGE GAINED IN PREVIOUS STEP LEVEL JOB PERFORMANCE.

KNOWLEDGE CATEGORY C - TEST INSTRUMENTS, HAND TOOLS AND PRINCIPLES OF ELECTRIC WIRING

Basic Electricity, Chapter 2 (Bureau of Naval Personnel, 1969)
Basic Electricity, Chapter 7 (Bureau of Naval Personnel, 1969)
Basic Electricity, Chapter 8 (Bureau of Naval Personnel, 1969)
Basic Electricity and D.C. Circuits, Section 5 (Oliva and Dale)
Basic Electricity and D.C. Circuits, Section 9 (Oliva and Dale)
Understanding Electricity and Electrons, Section 4 (Buban and Schmitt, third Edition)

KNOWLEDGE CATEGORY D - CIRCUIT BREAKER MAINTENANCE

American Electrical Standard Handbook, Chapter 1
American Electrician's Handbook, Section 1-40 (11th Edition)
Basic Electricity
Basic Electricity, Chapter 2
Basic Electricity, Chapter 8
Basic Electricity, Chapter 16
Basic Electricity and D.C. Circuits, Section 2 (authors: Oliva and Dale)
Basic Electricity and D.C. Circuits, Section 5 (Series Circuits)
Basic Electricity and D.C. Circuits, Section 6 (Introduction to Parallel Circuits)
Basic Electricity and D.C. Circuits, Section 7 (Parallel Circuit Analysis)
American Electrician's Handbook, Chapter 4 any basic electricity book (Ohm's Law)

Basic Electricity, Chapter 14
Basic Electricity and D.C. Circuits, Section 5 (Series Circuits)
Basic Electricity and D.C. Circuits, Section 7 (Parallel Circuit Analysis)
Basic Electricity and D.C. Circuits, Section 8 (Parallel-Series Circuits)
Transformer Application Fundamentals, Chapter 1 (Transformers' Fundamental Concepts)
American Electrician's Handbook, Chapter 1
Basic Electricity, Appendix 11
Basic Electricity, Chapter 12
Basic Electricity, Chapter 15
Basic Electricity, Chapter 19
Basic Electricity and D.C. Circuits, Section 2
Basic Electricity and D.C. Circuits, Section 18

KNOWLEDGE CATEGORY E - OPERATING PROCEDURES AND EQUIPMENT

American Electrician's Handbook (11th Edition), Section 1-401
Basic Electricity and D.C. Circuits, Section 1
Basic Electricity and D.C. Circuits, Section 2
Basic Electricity and D.C. Circuits, Section 5
Electrician's Manual: "Rotating Equipment".

KNOWLEDGE CATEGORY F - SAFETY AND VEHICLES

Division Order 50.30

Sample Questions

The following are samples of the type of questions, arranged by knowledge area, that you will encounter in this test. An answer page follows the questions.

KNOWLEDGE CATEGORY A - MAINTENANCE AND TRANSFORMER MAINTENANCE

1. **The cooling fans on a 66/12kV transformer are powered by:**
 - a. 100V A.C.
 - b. 110V D.C.
 - c. 220V A.C.
 - d. 220V D.C.

KNOWLEDGE CATEGORY B - INSULATOR BUSHING, DISCONNECT MAINTENANCE AND INSULATOR WASHING

2. **When using a 100 amp ductor, the C.T.'s must be shorted because of:**
 - a. creating a parallel path.
 - b. the ductor creating unfiltered D.C..
 - c. grounds being applied.
 - d. the possibility of a false reading.

KNOWLEDGE CATEGORY C - TEST INSTRUMENTS, HAND TOOLS AND PRINCIPLES OF ELECTRIC WIRING

3. **The Simpson 260/270 multimeters have two batteries internal to the meter. The batteries are:**
 - a. two 1.5V batteries.
 - b. one 1.5V and one 9V batteries.
 - c. one 6V and one AV battery.
 - d. two 9V batteries.

KNOWLEDGE CATEGORY D - CIRCUIT BREAKER MAINTENANCE

4. If circuit breaker main contacts move 10 inches in 10 cycles, the average speed of the main contacts in feet per seconds is:
- a. 2.5
 - b. 5.0
 - c. 7.5
 - d. 10.0

KNOWLEDGE CATEGORY E - OPERATING PROCEDURES AND EQUIPMENT

5. An inside clearance, at an unattended station, issued by the switching center may only be taken by:
- a. the person doing the work.
 - b. the cable crew foreman.
 - c. the line crew foreman.
 - d. the acting operator.

KNOWLEDGE CATEGORY F - SAFETY AND VEHICLES

6. A substation wash truck should have two sizes of nozzles on the truck. The nozzle sizes are:
- a. three 7/32" and one 1/4".
 - b. three 7/16" and one 1/4".
 - c. three 1/4" and one 7/32".
 - d. three 1/4" and one 7/16".

Answers to Sample Questions

1. c.
2. b.
3. b.
4. b.
5. d.
6. a.

