



Study Guide for Motor-Generator Specialist 1

Test Number: 2668

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

REV011411

Introduction

The **2668 Motor-Generator Specialist 1 Test** is a job knowledge test designed to cover the major knowledge areas 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 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 cellular/mobile phones, pagers or other electronic equipment will NOT be allowed in the testing area.

All questions on this test are multiple-choice or hot spot questions. Multiple choice questions have four possible answers. Hot spot questions have a picture, and you must click the correct spot on the picture to answer the question. All knowledge tests will be taken on the computer. For more information on this, please see the next section of this study guide on *Computer Based Testing*.

- **The test has a three hour time limit.**
- **No aids (such as calculators) will be allowed during testing.**

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.

Computer Based Testing

Taking an SCE knowledge test on the computer is simple. You do not need any computer experience or typing skills. You will only use the keyboard to enter your candidate ID and password. You'll answer all questions by pressing a single button on the mouse.

Log in Screen

You will be seated at a testing station. When you are seated, the computer will prompt you to enter the candidate ID and password you received in your invitation e-mail. You **MUST** have your candidate ID and password or you will be unable to take the test. Once you have confirmed your identity by entering this information, you will see a list of tests available to you.

Sample/Tutorial

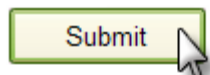
Before you start your actual test, a Sample/Tutorial Test is provided to help you become familiar with the computer and the mouse. From the list of exams that appear when you complete the log in, you will select Sample/Tutorial. You will have up to 10 minutes to take the Sample/Tutorial Test. The time you spend on this Sample Test does **NOT** count toward your examination time. Sample questions are included so that you may practice answering questions. In the Sample/Tutorial Test, you will get feedback on your answers. You will not receive feedback on your actual test.

Example

During the test, you may see several different types of items. Many of the questions will be multiple choice items. A few items will be pictures, where you'll have to click the spot on the picture that answers the question. Those picture questions are known as "Hot Spot" questions. More information on each type is below.

Overall Test Information

- When you begin the test, you can see the total time allowed for completion displayed at the top of the screen. You can scroll up to see that information at any time during the test.
- You can change your answers at any time during the test until the time runs out, or you click the "Submit" button. Once you click Submit, you can not change your answers.

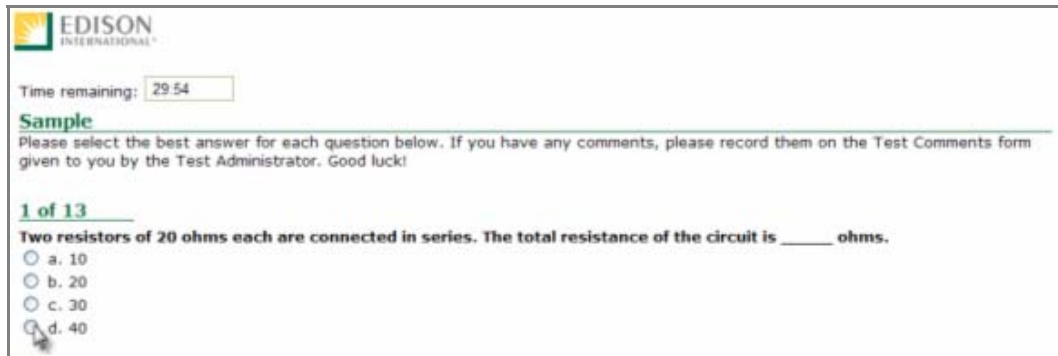


Multiple Choice Questions

To answer each multiple choice question, you should move the mouse pointer over the circle (radio button) next to the answer of your choice, and click the left mouse button.

A sample is shown below:

1. In order to answer each question, first read the question and determine the response that best answers the question. Put the mouse pointer directly over the circle corresponding to that response.



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Time remaining: 29:54

Sample

Please select the best answer for each question below. If you have any comments, please record them on the Test Comments form given to you by the Test Administrator. Good luck!

1 of 13

Two resistors of 20 ohms each are connected in series. The total resistance of the circuit is ____ ohms.

a. 10

b. 20

c. 30

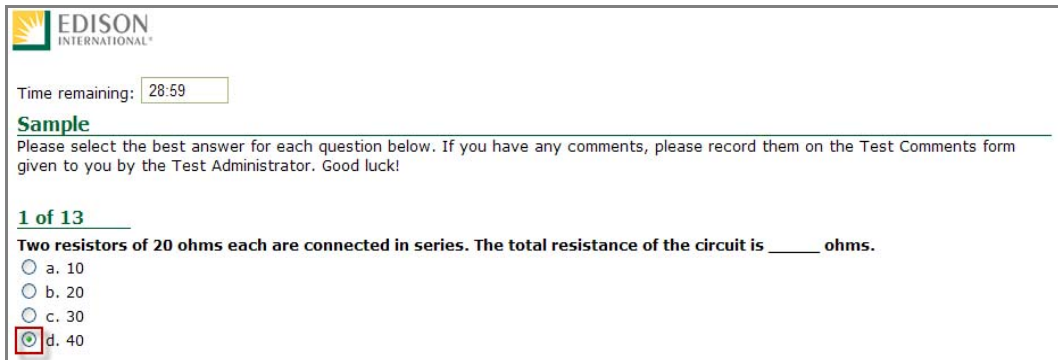
d. 40

2. While the pointer is over the circle corresponding to the best answer, click the left mouse button.



Click the left button when the pointer icon is over your answer choice.

3. The answer you selected should now have a green dot in the circle. If you need to select an alternate answer, simply move the pointer over that circle, and click again.



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Time remaining: 28:59

Sample

Please select the best answer for each question below. If you have any comments, please record them on the Test Comments form given to you by the Test Administrator. Good luck!

1 of 13

Two resistors of 20 ohms each are connected in series. The total resistance of the circuit is ____ ohms.

a. 10

b. 20

c. 30

d. 40

Hot Spot Questions

To answer each Hot Spot question, you should move the mouse pointer over the part of the image that best answers the question, and click the left mouse button. You will see a pointer appear in that spot. If you want to change your answer, simply move the mouse pointer to a new area on the picture and click again. The pointer will move to the new spot.

A sample is shown below:

1. In order to answer each question, first read the question and determine the place on the image that best answers the question. The pointer that will indicate your answer can always be seen in the bottom left of the image. It looks like this:



Put the mouse pointer directly over the spot on the image you want to select, and click the left mouse button.


The screenshot shows a web portal interface. At the top left, it says "1 of 8". Below that is the question: "On the screen below, where would you click to find out how much vacation time you have left?". The main content area is titled "About Me" and features a photo of a woman. Below the photo is a "Welcome to the 'About Me' section" message. A text box below the photo says: "'About Me' has information about your benefits, programs that help you in your work and/or home life and more. Click on the links below to access the various areas." Below this is an "About Me Map" section with four links: "Overview", "Career & Jobs", "Pay", and "Time & Attendance". A red arrow points from a text box "Pointer starts out at the bottom left of the image." to a small black dot in the bottom left corner of the map. Another red arrow points from a text box "Place the mouse pointer on the spot you want to select, then click on the left button." to a mouse cursor hovering over the "Time & Attendance" link.

2. The pointer will move from the bottom left of the image and appear over the spot you selected.

1 of 8

On the screen below, where would you click to find out how much vacation time you have left?





About Me



Welcome to the "About Me" section

"About Me" has information about your benefits, programs that help you in your work and/or home life and more. Click on the links below to access the various areas.

About Me Map

 Overview An Overview of what's contained in this section of the Portal	 Career & Jobs Find out about career information and opportunities at Edison International.
 Pay Find information about base pay, job descriptions, Results Sharing, and recognition awards here.	 Time & Attendance Use this section to complete and submit your timesheet for approval, or to view your time-off balances and time

The pointer now appears over the correct answer.

3. To change your answer, simply move the mouse pointer to the new spot, and click again. The pointer graphic will move to the new spot you've selected. In order for your answer to be considered correct, the center of the pointer (•) must be over the correct spot on the graphic.

Test Taking Strategies

Introduction

The **2668 Motor-Generator Specialist 1 Test** contains multiple-choice questions and may also contain hot spot 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
<i>Be confident</i>	<ul style="list-style-type: none"> - 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.
<i>Be punctual</i>	<ul style="list-style-type: none"> - Arrive early enough to feel relaxed and comfortable before the test begins.
<i>Concentrate</i>	<ul style="list-style-type: none"> - 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.
<i>Budget your times</i>	<ul style="list-style-type: none"> - Pace yourself carefully to ensure that you will have enough time to complete all items and review your answers.
<i>Read critically</i>	<ul style="list-style-type: none"> - 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.
<i>Make educated guesses</i>	<ul style="list-style-type: none"> - 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. On the computer, be sure that the new answer is selected instead of the old one.
- 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 math 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. When testing on the computer, make sure each multiple choice question has a green dot next to the correct answer.

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

Job Knowledge Categories and Study References

Below are the major job knowledge areas (topics) covered on the **2668 Motor-Generator Specialist 1 Test** and the associated study references. Listed next to each knowledge category is the number of items on the exam that will measure that topic. You can use this information to guide your studying. Some exams also contain additional pretest items. Pretest items will appear just like all of the other items on your exam, but they will not affect your score. They are an essential part of ensuring the **2668 Motor-Generator Specialist 1 Test** remains relevant to successful performance of the job.

There are a total of 92 items on the **2668 Motor-Generator Specialist 1 Test** and the passing score is 70%. This score was determined during the test validation process.

A. Electrical Testing and Measurement (27 items)

Knowledge of the proper use of measuring and test equipment including meggers, voltmeters, OD and ID micrometers, dial and digital calipers, dial indicators, multifunction testers, and feeler gauges. Knowledge of procedures for performing various tests including drop, bridge, growler, and spin. Knowledge of general safety procedures for testing motor/generators. Knowledge of various troubleshooting steps and the causes of motor/generator operating errors.

References for Electrical Testing and Measurement:

- ✓ Meinhard, Richard & Stewart, F.M. EASA Vo-Tech: Basic Shop Skills I. TPC Training Systems.
- ✓ Mileaf, Harry. Electricity One-Seven Electricity 5 book chapter. Prentice Hall, 1998.
- ✓ Walker, John R. Machining Fundamentals: From Basic to Advanced Techniques. Measurement book chapter. Goodheart-Wilcox Publisher, 1999.

B. Electrical Theory and Application (6 items)

Knowledge of electrical theory as it applies to motor-generator repair including Ohm's Law, resistance, and conductivity.

References for Electrical Theory and Application:

- ✓ Croft, Terrell & Summers, Wilford. American Electricians' Handbook: Division 1 Fundamentals & Division 2 Properties and Splicing of Conductors. McGraw – Hill, 1996.
- ✓ Hart, George & Hart, Sammie. Ugly's Electrical References. Burleson Distributing Co., 1999.

C. Diagrams and Symbols (3 items)

Knowledge of general connections diagrams and symbols as they apply to motor/generator connections.

References for Diagrams and Symbols:

- ✓ Croft, Terrell & Summers, Wilford. American Electricians' Handbook: Division 1 Fundamentals. McGraw – Hill, 1996.

D. Safety (9 items)

Knowledge of safe work practices for working around energized equipment and cleaning motor/generators. Knowledge of the various personal protective equipment used when performing motor/generator repair. Knowledge of fire hazards and fire prevention.

References for Safety:

- ✓ Mileaf, Harry. Electricity One-Seven *Electricity Two book chapter*. Prentice Hall, 1998.
- ✓ OSHA Standard 1910 Subpart I- Personal Protective Equipment, 1910.132 General Requirements.
- ✓ OSHA Standard 1910 Subpart H – Hazardous Materials, 1910.106 Flammable and Combustible Liquids.
- ✓ Walker, John R. Machine Fundamentals: From Basic to Advanced Techniques. *Shop Safety book chapter*. Goodheart-Wilcox Publisher, 1999.

E. Motor Generator Repairs (24 items)

Knowledge of procedures for repairing motors/generators including, brazing, soldering, installing and removing bearings, rolling bearings onto journals, and random winding repairs. Knowledge of various motor/generator components and their functions including insulation systems and materials. Knowledge of crimping, taping, and connecting leads. Knowledge of electrical components of motors/generators including series and parallel circuits. Knowledge of procedures for identifying damaged parts in motor/generator components and diagnosing equipment defects.

References for Motor Generator Repairs:

- ✓ Birkby, Evan. Ugly's Electric Motors and Controls. Jones and Bartlett Publishers, 2009.
- ✓ Dale, Cahrls. Basic Electricity & DC Circuits. Parallel Circuit Analysis, Series--Parallel Circuits, and Series Circuits book chapters . Prompt Publications, 1995.
- ✓ Jeffus, Larry. Welding Principles and Applications 6th edition. Delmar Cengage Learning, 2008.
- ✓ Mileaf, Harry. Electricity One-Seven 3rd edition: Electricity Five book chapter. Prentice Hall, 1998.
- ✓ Oberg, Erik & Jones, Franklin. Machinery's Handbook 28th Edition: Machining Operations & Machine Elements book chapters. Industrial Press, 2008.
- ✓ Pritchard, Derek. Soldering, Brazing, & Welding. Non-Fusion Joining Methods book chapter. The Crowood Press, 2001.
- ✓ Rosenberg, Robert & Hand, August. Electric Motor Repair 3rd Edition. Thomsen Delmar Learning.

F. Tools (11 items)

Knowledge of the set up and operation of shop equipment including drill presses, pedestal grinders, sanding machines, wire wheels and buffers, gas torch, as well as the ability to use hand tools used for inspecting and dismantling motors/generators.

References for Tools:

- ✓ Meinhard, Richard & Stewart, F.M EASA Vo-Tech: Basic Mechanics I. TPC Training Systems.
- ✓ Jeffus, Larry. Welding Principles and Applications 6th edition Oxyfuel Welding and Cutting Equipment, Setup, and Operation book chapter. Delmar Cengage Learning, 2008.
- ✓ Oberg, Erik & Jones, Franklin. Machinery's Handbook 28th Edition: Manufacturing Processes book chapter. Industrial Press, 2008.

G. Rigging (12 items)

Knowledge of rigging and material handling procedures including safety requirements for rigging and material handling equipment. Knowledge of the types and uses of lifting slings. Knowledge of operating cranes and forklifts. Knowledge of proper inspection techniques for rigging and material handling equipment. Knowledge of appropriate load weight to lifting sling capability.

References for Rigging:

- ✓ Garby, Ronald. IPT's Crane and Rigging Training Manual (revised edition 2005). IPT Publishing and Training LTD, 2005.
- ✓ OSHA Standard 1910 Subpart N- Materials Handling and Storage, 1910.178 Powered Industrial Trucks.

Sample Questions

The following sample questions should give you some idea of the form the test will take.

1. What is the first inspection when checking for worn bearings on a large motor?
 - a. Soft foot check
 - b. Cracks on rotor shaft
 - c. Air gap between rotor and stator
 - d. A surge test on the rotor and stator

2. The frame, core, windings, and end plates are all parts of the _____.
 - a. Rotor
 - b. Stator
 - c. Alternator
 - d. Induction motor

3. Which type of bearing would be best used on a vertical motor?
 - a. Spherical roller
 - b. Tapered roller
 - c. Two direction ball
 - d. One direction ball

Sample Question Answers

1. C
2. B
3. A

Study Guide Feedback

Please use this page to notify us of any changes in policies, procedures, or materials affecting this guide. Once completed, return to:

Southern California Edison
Human Resources - Performance Assessment Services
G.O. 4, Ground Floor
8631 Rush St.
Rosemead, CA 91770

Test Name: 2668 Motor-Generator Specialist 1

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