I. Safety — 15% of Overall Score

A. Risk Assessment

1. Identify safe work practices with regard to hazards encountered on the job
2. Identify requirements to create a safe work environment
3. Determine the location and implications of shock and arc-flash protection boundaries

B. Establish an Electrically Safe Work Condition

C. Employ Established Lockout/Tagout Procedures

D. Personal Protective Equipment (PPE)

1. Recognize PPE Categories and Shock Protection Boundaries
2. Apply correct use, storage, inspection, and testing of PPE

E. Safety Equipment Selection

1. Identify the safety equipment requirements of the task (e.g., hotstick, voltage detectors, insulated tools, fire extinguisher, etc.)
2. Apply correct use, storage, inspection, and testing of safety equipment

F. Confined Space

1. Identify confined spaces and related hazards
2. Identify permit requirements for confined spaces
3. Apply established confined space regulations

G. Isolation and Temporary Protective Grounding

1. Identify system isolation points
2. Apply correct voltage detection equipment
3. Verify correct temporary protective grounding equipment

H. Incident Energy Analysis

1. Interpret field-marked equipment labels
2. Identify hazards where no field-marked labels exist
3. Identify methods used to determine incident energy
4. Recognize how distance, current, time, and switchgear configuration affect incident energy
5. Identify Arc Flash Mitigation techniques in the NEC/CEC

I. Codes and Standards

1. Recognize the scope of standards and regulatory organizations (e.g., OSHA, OH&S, ANSI, ASTM, IEEE, NFPA, NEMA, CSA, CEC)
2. Apply technical requirements of ANSI/NETA Standards to assigned task
3. Comply with manufacturer's published data
4. Recognize how manufacturer's instructions and labeling affect safety, electrical testing, and maintenance.

II. Electrical Testing Fundamentals and Theory 25% of Overall Score

A. Fundamentals of Electricity

1. Apply fundamental physics, heat, and chemistry concepts as they relate to electricity
2. Recognize the standard units used to describe electrical circuits, energy, and power
3. Identify series and parallel circuits
4. Recognize the common effects of electromagnetic fields
5. Recognize dielectric properties of various insulation material/systems
6. Demonstrate knowledge of phasing and phase rotation

B. Electrical Calculations

1. Perform basic calculations utilizing algebra, geometry, and trigonometry
2. Apply fundamental electrical laws to simple circuits (e.g., Ohm's law, Kirchhoff's law, etc.)
3. Apply conversions between units (e.g., microhms to milliohms, horsepower to kilowatts, etc.)

C. AC and DC Circuits

1. Calculate electrical parameters in series and parallel circuits (e.g., power, voltage, current, resistance, etc.)
2. Calculate capacitive and inductive reactance
3. Apply methods for measuring impedance and power
4. Demonstrate knowledge of complex ac and dc circuits (e.g., voltage drop, real and reactive power, etc.)
5. Demonstrate knowledge of phase angle, power factor, and phasors

D. Insulation Systems

1. Employ methods and procedures for basic insulation tests
2. Analyze results from basic insulation tests
3. Recognize effects of Partial Discharge

E. Resistance Testing

1. Employ methods and procedures for resistance tests
2. Analyze results from resistance tests

F. Thermographic Survey

1. Employ methods and procedures for thermographic surveys (e.g., emissivity, delta-T, etc.)
2. Analyze results from thermographic surveys

G. Current Injection Testing

1. Employ methods and procedures for basic current tests (e.g., overcurrent pickup, circuit burden, voltage drop, etc.)
2. Analyze results from basic current tests

H. System Tests, Analysis, and Operation

1. Demonstrate knowledge of electrical one-line diagrams
2. Differentiate the purpose of schematic diagrams, three-line diagrams, wiring diagrams, and interconnection drawings
3. Identify electrical symbols and ANSI device numbers
4. Interpret time-current curves for basic protective devices
5. Recognize the purpose of short-circuit and coordination studies
6. Demonstrate knowledge of ANSI/NETA MTS Appendix C Frequency of Power System Studies

III. Component Testing — 55% of Overall Score

A. Component Testing - Switchgear, Switchboard, and Panelboard Assemblies

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

B. Component Testing - Transformers

1. Identify properties, types, and applications of transformers and auxiliary devices
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate test and inspection results

C. Component Testing - Cables

1. Identify properties, types, and applications of cables and accessories
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests
5. Demonstrate knowledge of cable fault locating

D. Component Testing - Metal-Enclosed Busways

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

E. Component Testing - Switches

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

F. Component Testing - Circuit Breakers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

G. Component Testing - Circuit Switchers

1. Identify properties, types, and applications

2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

H. Component Testing - Identify properties, types, and applications of Network Protectors

I. Component Testing - Protective Relays

1. Identify types and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic protective relays

J. Component Testing - Instrument Transformers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

K. Component Testing - Metering Devices

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

L. Component Testing - Regulating Apparatus

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections

M. Component Testing - Grounding Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

N. Component Testing - Ground-Fault Protection Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests

4. Evaluate test results for basic systems

O. Component Testing - Rotating Machinery

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

P. Component Testing - Motor Control Centers and Motor Starters

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

Q. Component Testing - Identify properties, types, and applications of Adjustable-Speed Drive Systems

R. Component Testing - Direct-Current Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

S. Component Testing - Surge Arresters

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

T. Component Testing - Capacitors and Reactors

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

U. Component Testing - Outdoor Bus Structures

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests

4. Evaluate results of basic electrical tests

V. Component Testing - Emergency Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

W. Component Testing - Automatic Circuit Reclosers and Line Sectionalizers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections

X. Component Testing - Fiber-Optic Cables

1. Identify fiber-optic cables
2. Recognize how to handle fiber-optic cables

Y. Component Testing - Electric Vehicle Charging Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

Z. Component Testing - Insulating Liquids and Gases

1. Identify properties, types, and applications
2. Perform sampling procedures
3. Perform ASTM dieletric breakdown tests
4. Evaluate results of ASTM dieletric breakdown tests

AA. Component Testing - Fuses

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for basic electrical tests
4. Evaluate results of basic electrical tests

IV. Systems and Commissioning — 5% of Overall Score

A. Troubleshooting

1. Identify protective device fault indications
2. Identify basic electrical equipment malfunctions

B. Functional Testing

1. Employ methods and procedures for basic system-function tests
2. Differentiate between component testing and functional testing

I. Safety — 13% of Overall Score

A. Risk Assessment

1. Identify safe work practices with regard to hazards encountered on the job
2. Identify requirements to create a safe work environment for self, crew, and others
3. Determine the location and implications of shock protection approach and arc-flash boundaries

B. Establish a Safe Work Condition (e.g., electrical, mechanical, chemical, etc.)

C. Implement Simple and Complex Lockout/Tagout Procedures

D. Personal Protective Equipment (PPE)

1. Determine requirements for Arc-Flash PPE Categories and Shock Protection approach boundaries
2. Supervise the correct use, storage, and testing of PPE for self and crew

E. Safety Equipment Selection

1. Identify the safety equipment needs of the project (e.g., hotstick, voltage detectors, insulated tools, fire extinguisher, etc.)
2. Supervise the correct use, storage, inspection, and testing of safety equipment for self and crew

F. Confined Space

1. Identify confined spaces and related hazards
2. Implement permit requirements for confined spaces
3. Apply established confined space regulations

G. Isolation and Temporary Protective Grounding

1. Develop system isolation and grounding procedures
2. Perform system switching procedures
3. Apply correct voltage detection equipment
4. Apply correct temporary protective grounding equipment

H. Incident Energy Analysis

1. Interpret field-marked equipment labels
2. Manage hazards where no field-marked labels exist
3. Utilize methods to determine incident energy
4. Mitigate risk based on variables affecting incident energy
5. Identify Arc Flash Mitigation techniques in the NEC/CEC

I. Codes and Standards

1. Apply standards and regulations (e.g., OSHA, OH&S, ANSI, ASTM, IEEE, NFPA, NEMA, CSA, etc.)

2. Apply technical requirements of ANSI/NETA Standards to assigned project
3. Comply with manufacturer's published data
4. Recognize how manufacturer's instructions and labeling affect safety, electrical testing, and maintenance.

II. Electrical Testing Fundamentals and Theory — 23% of Overall Score

A. Fundamentals of Electricity

1. Apply fundamental physics, heat, and chemistry concepts as they relate to electricity
2. Recognize the sources and common effects of electromagnetic fields
3. Recognize dielectric properties of various insulation materials/systems
4. Apply knowledge of phasing and phase rotation

B. Electrical Calculations

1. Perform calculations utilizing algebra, geometry, and trigonometry
2. Apply electrical laws to circuits (e.g., Ohm's law, Kirchhoff's law, etc.)
3. Perform complex/imaginary number calculations

C. AC and DC Circuits

1. Calculate electrical parameters in series and parallel circuits (e.g., power, voltage, current, resistance,etc.)
2. Calculate capacitive and inductive reactance
3. Apply methods for measuring and calculating impedance and power
4. Calculate variables of complex ac and dc circuits (e.g., voltage drop, real and reactive power, etc.)
5. Calculate phase angle, power factor, and phasors

D. Insulation Systems

1. Employ methods and procedures for insulation tests
2. Analyze results from insulation tests
3. Employ basic methods of analyzing Partial Discharge

E. Resistance Testing

1. Employ methods and procedures for resistance tests
2. Analyze results from resistance tests

F. Thermographic Survey

1. Employ methods and procedures for thermographic surveys (e.g., emissivity, delta-T, etc.)
2. Analyze results from thermographic surveys

G. Current Injection Testing

1. Employ methods and procedures for current tests (e.g., overcurrent pickup, circuit burden, voltage drop, etc.)
2. Analyze results from current tests

H. System Tests, Analysis, and Operation

1. Interpret electrical diagrams (e.g., one-line, metering and protection, etc.)
2. Interpret schematic diagrams, three-line diagrams, wiring diagrams, and interconnection drawings
3. Identify electrical symbols and ANSI device numbers
4. Recognize key parameters of coordination curves for protective systems
5. Recognize data collection requirements for short-circuit and coordination studies
6. Apply data from short-circuit and coordination studies to basic systems
7. Recognize causes and effects of power system harmonics
8. Demonstrate knowledge of ANSI/NETA MTS Appendix B Frequency of Maintenance Tests
9. Demonstrate knowledge of ANSI/NETA MTS Appendix C Frequency of Power System Studies

III. Component Testing — 47% of Overall Score

A. Component Testing - Switchgear, Switchboard, Panelboard Assemblies

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

B. Component Testing - Transformers

1. Identify properties, types, and applications of transformers and auxiliary devices
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

C. Component Testing - Cables

1. Identify properties, types, and applications of cables and accessories
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results
5. Employ methods for cable fault locating

D. Component Testing - Metal-Enclosed Busways

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

E. Component Testing - Switches

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

F. Component Testing - Circuit Breakers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

G. Component Testing - Circuit Switchers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

H. Component Testing - Network Protectors

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

I. Component Testing - Protective Relays

1. Identify types and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

J. Component Testing - Instrument Transformers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

K. Component Testing - Metering Devices and Transducers/Sensors

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

L. Component Testing - Regulating Apparatus

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

M. Component Testing - Grounding Systems

1. Identify properties, types, and applications

2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results
5. Demonstrate knowledge of methods to enhance effectiveness of grounding systems

N. Component Testing - Ground-Fault Protection Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

O. Component Testing - Rotating Machinery

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

P. Component Testing - Motor Control Centers and Motor Starters

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

Q. Component Testing - Adjustable-Speed Drive Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

R. Component Testing - Direct-Current Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

S. Component Testing - Surge Arresters

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests

4. Evaluate test and inspection results

T. Component Testing - Capacitors and Reactors

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

U. Component Testing - Outdoor Bus Structures

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

V. Component Testing - Emergency Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

W. Component Testing - Automatic Circuit Reclosers and Line Sectionalizers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

X. Component Testing - Fiber-Optic Cables

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Perform basic fiber tests
4. Evaluate test and inspection results

Y. Component Testing - Electric Vehicle Charging Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

Z. Component Testing - Insulating Liquids and Gases

1. Identify properties, types, and applications
2. Perform sampling procedures
3. Perform ASTM dieletric breakdown tests
4. Perform insulating gas field tests
5. Evaluate field tests and inspection results

AA. Component Testing - Fuses

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

IV. Systems and Commissioning — 17% of Overall Score

A. Troubleshooting

1. Examine fault indications
2. Perform documentation review
3. Analyze electrical equipment malfunctions
4. Determine cause of power system faults
5. Demonstrate knowledge of corrective actions
6. Employ methods and procedures for power quality monitoring/recording

B. SCADA and DCS Systems

1. Recognize basic equipment and configuration
2. Perform visual and mechanical inspections

C. Functional Testing

1. Employ methods and procedures for system-function tests
2. Identify the scope of owner project requirements, basis of design, and the commissioning plan
3. Differentiate between the three phases of the commissioning process
4. Employ methods and procedures for temporary power system monitoring

I. Safety — 10% of Overall Score

A. Risk Assessment

1. Manage safe work practices with regard to hazards encountered on the job
2. Implement requirements to create a safe work environment for self, crew, and others
3. Approve the shock and arc-flash risk assessments

B. Manage a safe work condition (electrical, mechanical, chemical, etc.)

C. Implement Complex Lockout/Tagout Procedures

D. Manage correct use, storage, and testing of personal protective equipment (PPE) personally and for entire crew

E. Manage the correct use, storage, inspection, and testing of safety equipment for self and crew

F. Supervise Compliance With Confined Space Regulations

G. Isolation and Temporary Protective Grounding

1. Develop a method of procedure
2. Perform On-site Supervision

H. Incident Energy Analysis

1. Recommend hazard mitigation where no field-marked labels exist
2. Utilize methods to determine incident energy
3. Mitigate risk based on variables affecting incident energy
4. Differentiate among Arc Flash Mitigation techniques in the NEC/CEC

I. Codes and Standards

1. Apply standards and regulations (e.g., OSHA, OH&S, ANSI, ASTM, IEEE, NFPA, NEMA, CSA, etc.)
2. Apply technical requirements of ANSI/NETA Standards to assigned project
3. Comply with manufacturer's published data
4. Recognize how manufacturer's instructions and labeling affect safety, electrical testing, and maintenance.

II. Electrical Testing Fundamentals and Theory — 15 % of Overall Score

A. Fundamentals of Electricity

1. Apply fundamental physics, heat, and chemistry concepts as they relate to electricity
2. Recognize the sources and effects of electromagnetic fields
3. Recognize dielectric properties of various insulation materials/systems
4. Apply knowledge of phasing and phase rotation
5. Apply knowledge of power flow

B. Electrical Calculations

1. Perform calculations utilizing algebra, geometry, and trigonometry
2. Demonstrate Knowledge of Boolean Logic
3. Apply electrical laws to complex circuits
4. Perform complex/imaginary number calculations

C. AC and DC Circuits

1. Calculate electrical parameters in complex series and parallel circuits (e.g., power, voltage, current, resistance, reactance, etc.)
2. Apply methods for measuring and calculating impedance and power
3. Calculate values of complex ac and dc circuits (e.g., voltage drop, real and reactive power, etc.)
4. Calculate phase angle, power factor, and phasors

D. Insulation Testing

1. Employ methods and procedures for insulation tests
2. Analyze results from insulation tests
3. Employ methods of analyzing Partial Discharge

E. Resistance Testing

1. Employ methods and procedures for resistance tests
2. Analyze results from resistance tests

F. Thermographic Survey

1. Employ methods and procedures for thermographic surveys (e.g., emissivity, delta-T, etc.)
2. Analyze results from thermographic surveys

G. Current Injection Testing

1. Employ methods and procedures for complex current tests (e.g., overcurrent pickup, circuit burden, voltage drop, etc.)
2. Analyze results from complex current tests

H. System Tests, Analysis, and Operation

1. Interpret electrical diagrams (e.g., one-line, metering and protection, etc.)
2. Interpret schematic diagrams, three-line diagrams, wiring diagrams, and interconnection drawings
3. Identify electrical symbols and ANSI device numbers
4. Interpret parameters of coordination curves for protective systems
5. Recognize components required for power system studies
6. Apply data from power system studies
7. Recognize causes and effects of power system harmonics
8. Apply knowledge of ANSI/NETA MTS Appendix B Frequency of Maintenance Tests
9. Apply knowledge of ANSI/NETA MTS Appendix C Frequency of Power System Studies

III. Component Testing — 55% of Overall Score

A. Component Testing - Switchgear, Switchboard, and Panelboard Assemblies

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

B. Component Testing - Transformers

1. Identify properties, types, and applications of transformers and auxiliary devices
2. Perform visual and mechanical inspections
3. Employ methods and procedures for advanced electrical tests
4. Evaluate test and inspection results

C. Component Testing - Cables

1. Identify properties, types, and applications of cables and accessories
2. Perform visual and mechanical inspections
3. Employ methods and procedures for advanced electrical tests
4. Evaluate test and inspection results
5. Employ methods of cable fault locating

D. Component Testing - Circuit Breakers

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for advanced electrical tests
4. Evaluate test and inspection results

E. Component Testing - Protective Relays

1. Identify types and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for advanced electrical tests
4. Evaluate test and inspection results
5. Verify internal logic functions

F. Component Testing - Instrument Transformers

1. Identify properties, types, and applications

2. Perform visual and mechanical inspections
3. Employ methods and procedures for advanced electrical tests
4. Evaluate test and inspection results

G. Component Testing - Regulating Apparatus

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

H. Component Testing - Grounding Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results
5. Recommend methods to enhance effectiveness of grounding systems

I. Component Testing - Ground-Fault Protection Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

J. Component Testing - Rotating Machinery

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for advanced electrical tests
4. Evaluate test and inspection results

K. Component Testing - Motor Control Centers and Motor Starters

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

L. Component Testing - Direct-Current Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

M. Component Testing - Capacitors and Reactors

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

N. Component Testing - Emergency Systems

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for electrical tests
4. Evaluate test and inspection results

O. Component Testing - Fiber-Optic Cables

1. Identify properties, types, and applications
2. Perform visual and mechanical inspections
3. Employ methods and procedures for optical tests
4. Evaluate test and inspection results

P. Insulating Liquids and Gases

1. Identify properties, types, and applications
2. Evaluate test and inspection results

IV. Systems and Commissioning — 20% of Overall Score

A. Troubleshooting

1. Basic analysis of fault indicators and event logs
2. Perform documentation review
3. Analyze electrical equipment malfunctions
4. Determine cause of power system faults
5. Recommend corrective actions
6. Employ methods and procedures for power quality monitoring/recording
7. Recognize basic power quality anomalies

B. SCADA and DCS Systems

1. Recognize basic equipment and configuration
2. Perform visual and mechanical inspections

C. Functional Testing

1. Employ methods and procedures for system-function tests
2. Review the scope of owner project requirements and basis of design
3. Develop the commissioning plan
4. Perform the three phases of the commissioning process
5. Employ methods and procedures for temporary power system monitoring
6. Analyze results of temporary power system monitoring