



LICQual

Level 6 Diploma in Electrical Quality Control and Quality Assurance QC/QA

Qualification Specification

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Contents

About LICQual	2
Course Overview	2
Certification Framework	3
Entry Requirements	3
Qualification Structure.....	3
Centre Requirements	4
Support for Candidates	5
Assessment.....	6
Unit Descriptors.....	7

Qualification Specifications about

LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC / QA

About LICQual

LICQual is a globally recognized awarding body based in the United Kingdom. Renowned for its commitment to excellence in education, LICQual specializes in delivering high-quality qualifications designed to meet the evolving needs of international learners, professionals, and industries. LICQual is dedicated to fostering innovative and flexible learning pathways, providing learners with the tools and knowledge to excel in dynamic professional landscapes. The organization emphasizes adherence to international qualification frameworks and standards, ensuring global recognition and applicability of its certifications.

The vision of LICQual is to establish itself as a global benchmark in quality education and skills development. Its mission is to equip individuals and organizations with internationally recognized qualifications that enhance employability, professional productivity, and academic progression.

Underpinned by a team of experienced professionals, including examiners, moderators, and assessors, LICQual ensures the highest standards of quality assurance and continuous improvement. Its qualifications are designed to empower individuals with the expertise and competencies necessary to thrive in today's competitive and ever-changing global environment.

Course Overview

The LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance (QC/QA) is designed for professionals in the electrical engineering field who seek to specialize in quality management. This qualification provides in-depth knowledge and practical skills in electrical QC/QA practices, focusing on international standards and regulatory compliance. It prepares individuals to manage and oversee the quality of electrical systems throughout their lifecycle, from design and installation to maintenance and performance monitoring. This diploma ensures that learners gain expertise to improve quality control processes and enhance their career prospects in the global electrical engineering market.

As industries and regulations become more stringent, the role of QC/QA professionals is critical in maintaining product and service integrity. This course equips learners with the advanced knowledge and practical skills required to effectively manage quality in electrical systems, from design and testing to installation and maintenance.

With a strong focus on international standards, this diploma will provide learners with the tools necessary to succeed in the global electrical engineering market. The course is structured to be comprehensive and career-focused, allowing learners to become experts in the field of electrical QC/QA.

Certification Framework

Qualification title	LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC/ QA
Course ID	LICQ2200175
Qualification Credits	120 Credits
Course Duration	6 to 12 Months
Grading Type	Pass / Fail
Competency Evaluation	Coursework / Assignments / Verifiable Experience
Assessment	<p>The assessment and verification process for LICQual qualifications ensures that learners achieve the required standards and maintain consistency across all Approved Training Centres (ATCs). This process is divided into two key stages:</p> <p>Internal Assessment and Verification:</p> <ul style="list-style-type: none"> ✓ This stage is conducted by the staff at the ATC, ensuring that learners meet the qualification standards through ongoing assessments. ✓ Internal Quality Assurance (IQA) is performed by the centre's designated IQA staff to validate and maintain the integrity of the assessment processes. <p>External Quality Assurance:</p> <ul style="list-style-type: none"> ✓ This stage is overseen by LICQual AB verifiers, who periodically review the centre's assessment and IQA procedures. ✓ The external verification ensures that assessments adhere to the required standards and that consistent practices are maintained across all centres.

Entry Requirements

To enroll in the LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC / QA, candidates should meet the following criteria:

- ✓ A Level 5 qualification in Electrical Engineering, Quality Management, or a related field.
- ✓ At least two years of professional experience in the electrical or engineering sectors.
- ✓ A solid understanding of electrical engineering principles and practices.
- ✓ Proficiency in English (IELTS 5.5 or equivalent for non-native speakers).

Qualification Structure

This qualification comprises 6 mandatory units, totaling 120 credits. Candidates must successfully complete all mandatory units to achieve the qualification.

Mandatory Units		
Unit Ref#	Unit Title	Credits
LICQ2200175 - 1	Advanced Quality Management Systems in Electrical Engineering	20
LICQ2200175 - 2	International Standards and Regulatory Compliance for Electrical Systems	20
LICQ2200175 - 3	Electrical Testing, Inspection, and Performance Evaluation	20
LICQ2200175 - 4	Risk Management and Safety in Electrical Quality Control	20
LICQ2200175 - 5	Root Cause Analysis (RCA) and Corrective Actions in Electrical Systems	20
LICQ2200175 - 6	Performance Monitoring and Continuous Improvement in Electrical Systems	20

Centre Requirements

To ensure the quality and consistency of training, assessment, and learner support for the LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC / QA , centres must meet the following requirements:

1. Approval to Deliver the Qualification

- ✓ Centres must obtain formal approval from LICQual to deliver this specific qualification, regardless of prior registration.
- ✓ The approval process involves a review of resources, staff qualifications, and policies to confirm alignment with the program's standards.

2. Qualified Staff

- ✓ **Tutors:** Tutors must hold qualifications relevant to electrical engineering, electrical installations, or related disciplines at Level 7 or higher. They should have substantial teaching experience or industrial QC/QA expertise to ensure effective delivery of the course.
- ✓ **Assessors:** Assessors need to possess recognized assessor qualifications, such as TAQA or equivalent, along with practical expertise in electrical QC/QA practices, including inspection, testing, and compliance management.
- ✓ **Internal Quality Assurers (IQAs):** IQAs must hold formal IQA certifications and demonstrate experience in overseeing assessment quality in electrical engineering or related fields to ensure adherence to high-quality standards.

3. Learning Facilities

Centres must provide appropriate learning environments to support both theoretical and practical components of the program:

- ✓ **Classrooms:** Centers must offer modern classrooms equipped with multimedia tools for interactive lessons on electrical quality control principles, alongside access to relevant standards, codes, and QA/QC frameworks.
- ✓ **Practical Areas:** The facilities should include labs and simulated setups to practice electrical testing, inspection, and compliance report preparation, reflecting real-world scenarios.
- ✓ **Technology Access:** Learners should have access to advanced computers with electrical engineering software, reliable internet, and platforms for digital QA/QC management, supporting project work and research.

4. Health and Safety Compliance

- ✓ Centres must comply with relevant health and safety regulations, ensuring that learning environments are safe and accessible.
- ✓ Regular risk assessments must be conducted to uphold safety standards, particularly during practical training or fieldwork activities.

5. Resource Requirements

- ✓ **Learning Materials:** Approved manuals, textbooks, and supplementary resources aligned with the curriculum and learning outcomes.
- ✓ **Assessment Tools:** Templates, marking guides, and standardized forms for conducting and recording assessments.
- ✓ **E-Learning Systems:** If offering online or hybrid learning, centres must provide a robust Learning Management System (LMS) to deliver course content and facilitate assessments remotely.

6. Assessment and Quality Assurance

- ✓ Centres must follow LICQual's standards for assessments, ensuring they are fair, valid, and reliable.
- ✓ Internal Quality Assurance (IQA) processes must be implemented to monitor assessments and offer constructive feedback to assessors.
- ✓ External verification visits by LICQual will be conducted periodically to ensure compliance with awarding body standards.

7. Learner Support

Centres must provide learners with access to guidance and support throughout the program, including:

- ✓ Academic assistance for coursework and assessments.
- ✓ Career guidance to support professional progression.
- ✓ Additional support for learners with specific needs, such as disabilities or language barriers.

8. Policies and Procedures

Centres must maintain and implement the following policies, as required by LICQual:

- ✓ Equal Opportunities Policy.
- ✓ Health and Safety Policy.
- ✓ Safeguarding Policies and Procedures.
- ✓ Complaints and Appeals Procedures.
- ✓ Data Protection and Confidentiality Policy.

9. Regular Reporting to LICQual

- ✓ Centres must submit periodic updates to LICQual, including details on learner enrollment, progress, and completion rates.
- ✓ Comprehensive records of assessments and learner achievements must be maintained and made available for external auditing.

By meeting these rigorous requirements, centres can ensure the successful delivery of the LICQual Level 6 Diploma in Electrical Quality Control and Quality Assurance QC / QA, providing learners with the highest quality education and professional development opportunities.

Support for Candidates

Centres should ensure that materials developed to support candidates:

- ✓ Enable the tracking of learners' progress as they achieve the specified learning outcomes and assessment criteria.
- ✓ Provide clear guidance on accessing LICQual's policies and procedures.
- ✓ Establish robust mechanisms to allow Internal and External Quality Assurance personnel to verify and authenticate evidence efficiently.

This structured approach promotes transparency, enhances the learning experience for candidates, and ensures adherence to high-quality assurance standards.

Assessment

This qualification is competence-based, requiring candidates to demonstrate their skills, knowledge, and understanding as outlined in the qualification units. The assessment is designed to measure candidates' proficiency against established standards. Key aspects include:

1. Assessment Process:

- ✓ Assessments must be conducted by qualified and experienced assessors.
- ✓ Candidates are required to compile a portfolio of evidence demonstrating achievement of all learning outcomes and assessment criteria for each unit.

2. Types of Evidence:

- ✓ Observation reports by the assessor.
- ✓ Assignments, projects, or reports.
- ✓ Professional discussions.
- ✓ Witness testimonies.
- ✓ Candidate-produced work.
- ✓ Worksheets.
- ✓ Records of oral and written questioning.
- ✓ Recognition of Prior Learning (RPL).

3. Learning Outcomes and Assessment Criteria:

- ✓ **Learning Outcomes:** Define what candidates should know, understand, or accomplish upon completing the unit.
- ✓ **Assessment Criteria:** Detail the standards candidates must meet to demonstrate that the learning outcomes have been achieved.

This framework ensures rigorous and consistent evaluation of candidates' competence in line with the qualification's objectives.

Unit Descriptors

LICQ2200175 – 1: Advanced Quality Management Systems in Electrical Engineering

The aim of this unit is to provide learners with a comprehensive understanding of advanced Quality Management Systems (QMS) and their application in electrical engineering. Learners will explore the key components of QMS and evaluate their role in ensuring compliance with industry standards and regulations. The unit will focus on designing and implementing effective quality control measures to improve performance and reliability in electrical engineering projects. Additionally, learners will assess various QMS frameworks (e.g., ISO 9001) and apply tools to monitor and enhance quality standards in electrical systems and processes.

Learning Outcome:	1. Understand the principles and components of advanced quality management systems (QMS) in electrical engineering.
Assessment Criteria:	<ul style="list-style-type: none"> 1.1. Demonstrate knowledge of the key principles underlying advanced quality management systems (QMS) in electrical engineering. 1.2. Identify and explain the core components of QMS used in the electrical engineering industry. 1.3. Assess how different QMS frameworks are implemented within electrical engineering projects. 1.4. Analyze the role of QMS in ensuring consistent product and service quality in electrical engineering. 1.5. Evaluate the effectiveness of various QMS components in achieving compliance with industry standards. 1.6. Explain the relationship between QMS and regulatory requirements in electrical engineering projects. 1.7. Discuss the impact of QMS on reducing errors, improving efficiency, and ensuring safety in electrical engineering practices. 1.8. Illustrate how QMS facilitates continuous improvement and risk management within electrical engineering projects. 1.9. Provide examples of successful QMS implementation in real-world electrical engineering scenarios, demonstrating understanding of its practical application.
Learning Outcome:	2. Evaluate the role of quality management systems in ensuring compliance with industry standards and regulations.
Assessment Criteria:	<ul style="list-style-type: none"> 2.1 Demonstrate an understanding of the key components of quality management systems (QMS) in the context of civil engineering. 2.2 Identify relevant industry standards and regulations that apply to civil engineering projects. 2.3 Explain how QMS frameworks help meet legal and regulatory requirements in civil engineering. 2.4 Assess the effectiveness of various QMS models in ensuring compliance with specific industry standards. 2.5 Evaluate the role of internal audits and reviews in maintaining compliance with regulations. 2.6 Analyze the impact of non-compliance on project outcomes, including safety, cost, and reputation.

	<p>2.7 Discuss the relationship between continuous improvement processes and regulatory compliance in QMS.</p> <p>2.8 Provide examples of how QMS have been successfully implemented in civil engineering projects to ensure industry standard compliance.</p> <p>2.9 Recommend improvements to existing QMS based on assessment of regulatory compliance needs.</p>
Learning Outcome:	3. Design and implement quality control measures within electrical engineering projects to enhance performance and reliability.
Assessment Criteria:	<p>3.1 Develop a comprehensive quality control plan tailored to the specific requirements of an electrical engineering project.</p> <p>3.2 Identify key performance indicators (KPIs) and benchmarks to measure the effectiveness of quality control measures.</p> <p>3.3 Select appropriate tools and techniques for monitoring and testing electrical systems to ensure compliance with quality standards.</p> <p>3.4 Implement quality control processes at each stage of the project lifecycle, from design to installation and commissioning.</p> <p>3.5 Conduct regular inspections and audits to verify adherence to the established quality control procedures.</p> <p>3.6 Analyze data from inspections, tests, and audits to assess system performance and identify areas for improvement.</p> <p>3.7 Adjust and refine quality control measures based on feedback, testing results, and performance evaluations.</p> <p>3.8 Ensure that quality control measures align with relevant industry standards, codes, and regulatory requirements.</p> <p>3.9 Communicate the results of quality control processes to stakeholders, including recommendations for improvements or corrective actions.</p>
Learning Outcome:	4. Assess the effectiveness of various QMS frameworks (e.g., ISO 9001) in the electrical engineering context.
Assessment Criteria:	<p>4.1 Evaluate the key components of various Quality Management Systems (QMS) frameworks such as ISO 9001 and their application within electrical engineering projects.</p> <p>4.2 Analyze how ISO 9001 and other QMS frameworks address quality management principles in the context of electrical engineering.</p> <p>4.3 Identify the strengths and limitations of different QMS frameworks when implemented in electrical engineering settings.</p> <p>4.4 Compare the effectiveness of ISO 9001 in meeting the specific needs of electrical engineering quality standards and compliance.</p> <p>4.5 Assess the ability of QMS frameworks to enhance consistency, reliability, and efficiency in electrical engineering projects.</p> <p>4.6 Review case studies or examples where QMS frameworks have been successfully implemented in electrical engineering projects, noting the outcomes.</p> <p>4.7 Evaluate the alignment of QMS frameworks with industry regulations, standards, and client expectations in electrical engineering.</p> <p>4.8 Examine the impact of QMS frameworks on continuous improvement and risk management in electrical engineering processes.</p>

	4.9 Critically assess how well QMS frameworks integrate with other management practices (e.g., safety, environmental management) within the electrical engineering sector.
Learning Outcome:	5. Apply tools and techniques to monitor and improve quality standards in electrical systems and processes.
Assessment Criteria:	<p>5.1 Demonstrate the use of appropriate tools and techniques to monitor the quality of electrical systems and processes.</p> <p>5.2 Identify key indicators of quality performance in electrical systems and explain their relevance to quality monitoring.</p> <p>5.3 Select and apply suitable measurement tools to assess the performance and functionality of electrical components and systems.</p> <p>5.4 Use diagnostic tools to detect deviations from quality standards and identify potential causes of issues.</p> <p>5.5 Implement corrective actions based on monitoring data to ensure electrical systems meet quality standards.</p> <p>5.6 Apply continuous improvement methodologies to enhance the quality of electrical systems and processes.</p> <p>5.7 Evaluate the effectiveness of quality improvement initiatives using performance metrics and feedback.</p> <p>5.8 Ensure compliance with industry standards and regulations during quality monitoring and improvement activities.</p> <p>5.9 Document monitoring processes and quality improvement actions clearly and comprehensively for future reference.</p>

LICQ2200175 – 2: International Standards and Regulatory Compliance for Electrical Systems

The aim of this unit is to provide learners with a deep understanding of international standards governing electrical systems, such as IEC and ISO, and their global implications. Learners will analyze regulatory requirements across various regions and industries, gaining the knowledge needed to navigate the compliance process. The unit will also emphasize the impact of non-compliance on safety, performance, and operational efficiency, while equipping learners to apply regulatory guidelines to ensure electrical systems meet safety, environmental, and technical standards.

Learning Outcome:	1. Understand the international standards governing electrical systems (e.g., IEC, ISO) and their global implications.
Assessment Criteria:	<ol style="list-style-type: none"> 1.1. Identify key international standards relevant to electrical systems, such as IEC and ISO. 1.2. Explain the scope and purpose of these standards within the context of electrical systems. 1.3. Describe the global impact of adhering to international electrical standards on safety and performance. 1.4. Assess the role of international standards in ensuring the reliability and interoperability of electrical systems. 1.5. Compare and contrast international standards with local or national regulations in electrical systems. 1.6. Demonstrate an understanding of how compliance with international standards affects global trade and industry practices. 1.7. Examine case studies where non-compliance with international electrical standards led to significant issues. 1.8. Analyze the evolving nature of international electrical standards in response to technological advancements. 1.9. Evaluate the benefits and challenges of implementing international standards in electrical engineering projects.
Learning Outcome:	2. Analyze the regulatory requirements for electrical systems across different regions and industries.
Assessment Criteria:	<ol style="list-style-type: none"> 2.1 Identify and describe the key regulatory requirements for electrical systems in various regions, referencing international standards and local codes. 2.2 Explain the significance of adhering to electrical regulations and the potential consequences of non-compliance for safety and legal liability. 2.3 Compare and contrast the regulatory frameworks for electrical systems in different industries, such as residential, commercial, and industrial sectors. 2.4 Evaluate the impact of regulatory requirements on the design, installation, and maintenance of electrical systems. 2.5 Analyze the role of regulatory bodies and standards organizations in establishing and enforcing electrical system requirements. 2.6 Interpret key electrical regulations, including safety codes, environmental standards, and performance criteria, and apply them to specific scenarios. 2.7 Assess the alignment of current electrical system practices with regulatory requirements and identify any gaps or areas for improvement.

	<p>2.8 Propose strategies for ensuring compliance with regional and industry-specific electrical standards during the planning and implementation of electrical systems.</p> <p>2.9 Demonstrate the ability to research and apply up-to-date regulatory changes affecting electrical systems in different regions and industries.</p>
Learning Outcome:	3. Demonstrate knowledge of the compliance process for electrical systems with relevant national and international standards.
Assessment Criteria:	<p>3.1 Define the compliance process for electrical systems in accordance with national and international standards.</p> <p>3.2 Identify key national and international standards that apply to electrical systems, including but not limited to IEC, NEC, and ISO.</p> <p>3.3 Explain the legal, safety, and regulatory requirements associated with compliance for electrical systems.</p> <p>3.4 Evaluate the impact of non-compliance on electrical system safety, functionality, and legal obligations.</p> <p>3.5 Demonstrate understanding of how to assess the compliance of electrical systems throughout different stages of a project, from design to implementation.</p> <p>3.6 Describe the documentation and reporting requirements for demonstrating compliance with relevant standards.</p> <p>3.7 Analyze case studies where compliance issues were identified and recommend corrective actions based on international standards.</p> <p>3.8 Identify stakeholders responsible for ensuring compliance within electrical systems and their roles in the process.</p> <p>3.9 Assess the effectiveness of various methods and tools used to ensure ongoing compliance with electrical system standards.</p>
Learning Outcome:	4. Evaluate the impact of non-compliance on safety, performance, and operational efficiency.
Assessment Criteria:	<p>4.1 Evaluate the potential safety hazards that can arise from non-compliance with industry standards in civil engineering projects.</p> <p>4.2 Assess the impact of non-compliance on the performance and functionality of construction materials and structures.</p> <p>4.3 Identify the operational inefficiencies that result from failure to adhere to quality control and assurance standards.</p> <p>4.4 Analyze the long-term consequences of non-compliance on project timelines and costs.</p> <p>4.5 Examine how non-compliance affects regulatory compliance and legal implications in civil engineering.</p> <p>4.6 Assess the environmental and sustainability risks associated with non-compliance in construction processes.</p> <p>4.7 Investigate the potential damage to a company's reputation and client trust resulting from non-compliance.</p> <p>4.8 Evaluate corrective actions required to mitigate the impact of non-compliance and restore safety and efficiency.</p> <p>4.9 Use case studies to demonstrate the real-world consequences of non-compliance and propose solutions to prevent recurrence.</p>
Learning Outcome:	5. Apply regulatory guidelines to ensure electrical systems are compliant with

	safety, environmental, and technical standards.
Assessment Criteria:	<ul style="list-style-type: none"> 5.1. Identify relevant safety, environmental, and technical standards applicable to electrical systems. 5.2. Interpret and apply national and international regulatory guidelines to electrical system design and implementation. 5.3. Ensure electrical systems comply with environmental regulations by selecting appropriate materials and methods. 5.4. Evaluate the compliance of electrical systems with safety standards, including electrical protection and risk management measures. 5.5. Verify that electrical systems are designed to meet the technical standards specified for performance, reliability, and efficiency. 5.6. Review the documentation for electrical systems to ensure compliance with regulatory guidelines and industry best practices. 5.7. Conduct risk assessments to identify potential non-compliance areas in electrical systems. 5.8. Propose corrective actions to address any identified non-compliance issues, ensuring alignment with regulatory guidelines. 5.9. Maintain up-to-date knowledge of changes in regulations and standards, applying them to ensure ongoing compliance in electrical system projects.

LICQ2200175 – 3: Electrical Testing, Inspection, and Performance Evaluation

The aim of this unit is to equip learners with a comprehensive understanding of electrical testing and inspection methods for evaluating electrical systems and components. Learners will gain practical knowledge of various testing methods, including functional, performance, and diagnostic testing, and how to analyze test results to assess system performance in line with international standards. The unit also focuses on implementing inspection techniques to ensure safety, quality, and reliability, as well as identifying performance issues and proposing solutions to improve electrical systems.

Learning Outcome:	1. Understand the key principles of electrical testing and inspection methods for electrical systems and components.
Assessment Criteria:	<ol style="list-style-type: none"> 1.1. Define the key principles of electrical testing and inspection methods used for electrical systems and components. 1.2. Explain the importance of electrical testing and inspection in ensuring safety and compliance with industry standards. 1.3. Identify different types of electrical testing methods, such as continuity, insulation resistance, and earth fault loop impedance testing. 1.4. Describe the roles of various electrical inspection procedures in identifying defects or non-compliance in electrical installations. 1.5. Demonstrate knowledge of relevant international and regional standards for electrical testing and inspection, such as IEC, IEEE, and local regulatory requirements. 1.6. Apply the appropriate electrical testing methods to various electrical systems and components, including wiring, outlets, circuit breakers, and equipment. 1.7. Interpret test results accurately to determine whether electrical systems meet safety and operational standards. 1.8. Identify common issues or faults that can be detected through electrical testing and inspection and recommend corrective actions. 1.9. Evaluate the effectiveness of different testing methods in ensuring the reliability and safety of electrical systems and components.
Learning Outcome:	2. Apply various testing methods (e.g., functional, performance, and diagnostic testing) to evaluate electrical systems.
Assessment Criteria:	<ol style="list-style-type: none"> 2.1 Accurately identify the appropriate testing method (functional, performance, or diagnostic) based on the type of electrical system being evaluated. 2.2 Demonstrate the ability to set up and configure testing equipment to meet the specifications for the electrical system being assessed. 2.3 Perform functional tests to verify the operational efficiency and effectiveness of electrical systems in accordance with industry standards. 2.4 Conduct performance testing to assess the electrical system’s ability to operate under various load conditions and ensure compliance with project specifications. 2.5 Use diagnostic testing techniques to identify faults, inconsistencies, or malfunctions within electrical systems and accurately document the results. 2.6 Interpret test data to determine the condition and performance of electrical systems, ensuring compliance with relevant safety and quality standards. 2.7 Compare test results against established benchmarks and specifications to

	<p>evaluate the system's conformance to required standards.</p> <p>2.8 Identify and address any discrepancies or deviations found during testing, implementing corrective actions where necessary.</p> <p>2.9 Record and report testing outcomes accurately, providing detailed documentation and recommendations for improvements or adjustments to the electrical system.</p>
Learning Outcome:	3. Analyze test results and assess the performance of electrical systems based on international standards.
Assessment Criteria:	<p>3.1 Demonstrate the ability to interpret test results related to electrical systems.</p> <p>3.2 Apply relevant international standards for assessing the performance of electrical systems.</p> <p>3.3 Identify discrepancies between test results and performance expectations according to international standards.</p> <p>3.4 Evaluate the impact of any performance deviations on system functionality and safety.</p> <p>3.5 Critically assess the methods used for conducting tests, ensuring alignment with international best practices.</p> <p>3.6 Provide recommendations for improvements or adjustments based on performance analysis.</p> <p>3.7 Ensure all analysis and recommendations comply with current regulatory and industry standards.</p> <p>3.8 Document and present test analysis results, ensuring clarity and accuracy for stakeholders.</p> <p>3.9 Use industry-standard tools and software to analyze and assess electrical system performance data.</p>
Learning Outcome:	4. Implement appropriate inspection techniques to ensure safety, quality, and reliability in electrical systems.
Assessment Criteria:	<p>4.1 Accurately select and apply relevant inspection techniques based on project requirements and industry standards.</p> <p>4.2 Demonstrate proficiency in using inspection tools and equipment to assess the quality and safety of electrical systems.</p> <p>4.3 Perform visual inspections to identify defects, wear, and other issues affecting electrical system performance.</p> <p>4.4 Conduct detailed tests on electrical components, circuits, and systems to verify functionality and compliance with safety regulations.</p> <p>4.5 Record and report inspection findings, including identifying any non-conformance or deviations from project specifications.</p> <p>4.6 Interpret inspection results to determine compliance with applicable international standards and local regulations.</p> <p>4.7 Collaborate with relevant stakeholders to ensure corrective actions are taken for any identified defects or risks.</p> <p>4.8 Demonstrate the ability to assess potential safety hazards and implement preventative measures during the inspection process.</p> <p>4.9 Ensure adherence to health and safety protocols during inspections to maintain a</p>

	safe working environment for all personnel.
Learning Outcome:	5. Identify performance issues in electrical systems through systematic testing and propose solutions for improvement.
Assessment Criteria:	<p>5.1. Conduct systematic testing on electrical systems to identify performance issues in alignment with established international standards.</p> <p>5.2. Use appropriate diagnostic tools and techniques to assess the functionality and efficiency of electrical components.</p> <p>5.3. Analyze test results to pinpoint areas where performance issues may exist within the electrical systems.</p> <p>5.4. Identify the root causes of performance issues based on data and relevant industry guidelines.</p> <p>5.5. Evaluate the impact of identified issues on system efficiency, safety, and reliability.</p> <p>5.6. Propose practical and effective solutions for improving the performance of the electrical system.</p> <p>5.7. Ensure that proposed solutions comply with relevant safety regulations, electrical standards, and best practices.</p> <p>5.8. Demonstrate the ability to prioritize solutions based on urgency and potential impact on system operation.</p> <p>5.9. Provide clear and actionable recommendations for the implementation of performance improvement measures.</p>

LICQ2200175 – 4: Risk Management and Safety in Electrical Quality Control

The aim of this unit is to provide learners with a thorough understanding of risk management principles in electrical systems, focusing on hazard identification and risk assessment techniques. Learners will explore various risk management frameworks, such as FMEA and Fault Tree Analysis, to evaluate safety and quality in electrical engineering projects. The unit will also focus on applying effective safety protocols and measures to mitigate risks, ensuring enhanced safety outcomes and quality control in electrical systems.

Learning Outcome:	1. Understand the principles of risk management in electrical systems, including hazard identification and risk assessment.
Assessment Criteria:	<ul style="list-style-type: none"> 1.1. Define the key principles of risk management in electrical systems. 1.2. Explain the process of hazard identification in electrical systems, including common hazards. 1.3. Describe the methods used for risk assessment in electrical systems. 1.4. Identify the stages of a risk management process specific to electrical systems. 1.5. Evaluate the effectiveness of various hazard identification techniques. 1.6. Apply appropriate risk assessment methods to different electrical systems. 1.7. Demonstrate the ability to prioritize risks based on severity and likelihood. 1.8. Analyze case studies to assess how risk management principles have been applied in real-world electrical systems. 1.9. Discuss the role of legislation and standards in electrical risk management practices.
Learning Outcome:	2. Analyze potential safety risks in electrical systems and recommend effective risk mitigation strategies.
Assessment Criteria:	<ul style="list-style-type: none"> 2.1 Identify and describe common safety risks associated with electrical systems in various environments. 2.2 Evaluate the potential impact of identified safety risks on workers, equipment, and the surrounding environment. 2.3 Apply relevant international safety standards and regulations to assess risks in electrical systems. 2.4 Use industry-specific risk assessment tools and methodologies to analyze safety hazards. 2.5 Propose practical and effective risk mitigation strategies tailored to specific electrical system risks. 2.6 Demonstrate an understanding of control measures, such as isolation, protective devices, and safety protocols, to minimize safety hazards. 2.7 Justify the recommended risk mitigation strategies based on their effectiveness in reducing or eliminating safety risks. 2.8 Recommend monitoring and review procedures to ensure the continued effectiveness of implemented safety strategies. 2.9 Provide a risk assessment report with clear recommendations, supporting data, and references to relevant safety standards.
Learning Outcome:	3. Apply risk management frameworks (e.g., FMEA, Fault Tree Analysis) to evaluate safety and quality in electrical engineering projects.
Assessment Criteria:	<ul style="list-style-type: none"> 3.1 Identify the key components of risk management frameworks such as FMEA

	<p>(Failure Modes and Effects Analysis) and Fault Tree Analysis in the context of electrical engineering projects.</p> <p>3.2 Select appropriate risk management frameworks based on the specific needs and nature of the electrical engineering project.</p> <p>3.3 Conduct a risk assessment by applying FMEA to identify potential failure modes, their effects, and the likelihood of occurrence in an electrical engineering project.</p> <p>3.4 Utilize Fault Tree Analysis to assess system reliability and the root causes of risks in electrical engineering projects.</p> <p>3.5 Evaluate the impact of identified risks on project safety, quality, and performance.</p> <p>3.6 Propose risk mitigation strategies and control measures based on the findings from FMEA and Fault Tree Analysis.</p> <p>3.7 Document and communicate the results of risk assessments, including identified risks, severity, likelihood, and mitigation actions, in a clear and structured manner.</p> <p>3.8 Demonstrate the ability to integrate risk management frameworks into the overall project management plan, ensuring alignment with safety and quality objectives.</p> <p>3.9 Review and update risk management plans regularly throughout the project lifecycle to ensure ongoing safety and quality assurance.</p>
Learning Outcome:	4. Evaluate the effectiveness of safety protocols and standards in managing electrical system risks.
Assessment Criteria:	<p>4.1 Critically assess the safety protocols and standards used in electrical systems for identifying potential risks.</p> <p>4.2 Examine the alignment of safety protocols with international standards and regulatory frameworks.</p> <p>4.3 Analyze the impact of safety protocols on reducing electrical hazards and mitigating risks.</p> <p>4.4 Evaluate the effectiveness of safety protocols in preventing electrical system failures or accidents.</p> <p>4.5 Compare the effectiveness of current safety protocols with historical data on electrical system incidents.</p> <p>4.6 Assess the role of safety protocols in ensuring the protection of personnel, equipment, and property in electrical systems.</p> <p>4.7 Investigate the implementation and enforcement of safety standards within electrical projects and operations.</p> <p>4.8 Identify areas for improvement in existing safety protocols based on industry best practices and emerging risks.</p> <p>4.9 Recommend modifications to safety protocols to enhance risk management and compliance with updated regulations.</p>
Learning Outcome:	5. Implement safety measures to reduce risks and improve safety outcomes in electrical quality control processes.
Assessment Criteria:	<p>5.1. Identify and assess potential safety risks associated with electrical quality control processes.</p> <p>5.2. Develop and apply appropriate safety measures in alignment with industry</p>

	<p>standards and regulations.</p> <ol style="list-style-type: none">5.3. Demonstrate the use of personal protective equipment (PPE) and other safety protocols in electrical quality control activities.5.4. Ensure compliance with relevant national and international safety standards (e.g., OSHA, IEC).5.5. Evaluate the effectiveness of implemented safety measures through regular safety audits and inspections.5.6. Record and report safety incidents and near-misses, taking corrective actions where necessary.5.7. Provide training and guidance to team members on best practices for safety in electrical quality control.5.8. Implement risk mitigation strategies to minimize hazards during the inspection, testing, and installation processes.5.9. Maintain up-to-date safety documentation, including safety plans, risk assessments, and compliance reports.
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LICQ2200175– 5: Root Cause Analysis (RCA) and Corrective Actions in Electrical Systems

The aim of this unit is to equip learners with the tools and techniques to perform Root Cause Analysis (RCA) in electrical systems, focusing on identifying underlying causes of system failures or inefficiencies. Learners will apply RCA methods, such as Fishbone Diagrams and the 5 Whys, to analyze system performance and safety impacts. The unit also emphasizes designing and implementing corrective actions based on RCA findings, and monitoring these actions to ensure continuous improvement and prevent recurrence of issues in electrical systems.

Learning Outcome:	1. Understand the concept and methodology of Root Cause Analysis (RCA) in electrical systems.
Assessment Criteria:	<ol style="list-style-type: none"> 1.1. Define Root Cause Analysis (RCA) and explain its purpose in identifying and solving problems within electrical systems. 1.2. Describe the key principles and methodology of RCA, including its systematic approach to problem-solving. 1.3. Identify the steps involved in conducting an RCA for electrical system issues, from problem identification to root cause determination. 1.4. Explain the importance of data collection and analysis in RCA for accurate identification of underlying issues. 1.5. Differentiate between reactive and proactive RCA methods and explain when each approach is appropriate in electrical systems. 1.6. Apply RCA techniques to real-world electrical system problems, demonstrating the ability to identify and address root causes effectively. 1.7. Evaluate the effectiveness of RCA in improving system reliability, safety, and performance in electrical engineering. 1.8. Assess potential challenges or limitations of using RCA in electrical systems and propose solutions to overcome these issues. 1.9. Provide evidence of using RCA tools, such as fishbone diagrams, 5 Whys, or fault tree analysis, in the analysis of electrical system failures.
Learning Outcome:	2. Apply various RCA techniques (e.g., Fishbone Diagram, 5 Whys) to identify the underlying causes of electrical system failures or inefficiencies.
Assessment Criteria:	<ol style="list-style-type: none"> 2.1 Demonstrate the ability to select appropriate RCA techniques based on the nature of the electrical system failure or inefficiency. 2.2 Effectively construct and use a Fishbone Diagram to categorize potential causes of electrical system issues. 2.3 Apply the 5 Whys technique to trace root causes of failures in an electrical system, ensuring logical and systematic questioning. 2.4 Collect relevant data to support the RCA process, ensuring it is comprehensive and accurate. 2.5 Analyze the identified causes and distinguish between immediate, underlying, and root causes of the failure or inefficiency. 2.6 Evaluate the effectiveness of the RCA techniques applied in identifying the true cause of the issue. 2.7 Document the RCA process clearly, outlining each step and the rationale behind the chosen techniques. 2.8 Communicate the findings of the RCA in a professional report, summarizing key

	<p>insights and recommendations for corrective actions.</p> <p>2.9 Recommend corrective actions or improvements based on the identified root causes, ensuring they address the underlying issues in the electrical system.</p>
Learning Outcome:	3. Evaluate the impact of identified root causes on system performance and safety.
Assessment Criteria:	<p>3.1 Demonstrate the ability to identify and analyze root causes affecting system performance and safety.</p> <p>3.2 Assess the relationship between root causes and the overall system effectiveness in a structured manner.</p> <p>3.3 Use industry-standard tools and techniques to evaluate the severity and impact of root causes on system performance.</p> <p>3.4 Evaluate the consequences of root causes on safety measures and identify potential risks.</p> <p>3.5 Investigate how identified root causes influence operational efficiency and safety protocols.</p> <p>3.6 Interpret data and findings to draw connections between root causes and system vulnerabilities.</p> <p>3.7 Recommend corrective actions based on the evaluation of root causes and their effects.</p> <p>3.8 Apply risk assessment methodologies to determine the significance of root causes on safety and system reliability.</p> <p>3.9 Present a detailed report with well-supported conclusions and solutions addressing the root causes' impact on system performance and safety.</p>
Learning Outcome:	4. Design corrective actions based on RCA findings to address electrical system issues and prevent recurrence.
Assessment Criteria:	<p>4.1 Identify and analyze the root causes of electrical system issues through Root Cause Analysis (RCA) techniques.</p> <p>4.2 Evaluate the potential impact of identified root causes on the overall system performance and reliability.</p> <p>4.3 Design corrective actions that directly address the root causes of electrical system failures.</p> <p>4.4 Ensure corrective actions align with industry best practices and international standards for electrical systems.</p> <p>4.5 Develop a comprehensive plan for implementing corrective actions, including timelines and resource requirements.</p> <p>4.6 Consider the long-term sustainability and effectiveness of the corrective actions in preventing recurrence.</p> <p>4.7 Verify that corrective actions comply with safety, regulatory, and quality standards.</p> <p>4.8 Demonstrate an understanding of the interrelationship between corrective actions and broader system performance goals.</p> <p>4.9 Provide clear documentation outlining the corrective actions, their implementation process, and the expected outcomes.</p>
Learning Outcome:	5. Monitor the implementation of corrective actions to ensure continuous improvement in electrical systems.
Assessment Criteria:	<p>5.1. Demonstrate the ability to monitor the execution of corrective actions in</p>

	<p>electrical systems through systematic tracking and reporting.</p> <ol style="list-style-type: none">5.2. Identify key performance indicators (KPIs) that measure the effectiveness of corrective actions in improving electrical system performance.5.3. Evaluate the impact of corrective actions on the overall performance and reliability of electrical systems.5.4. Ensure that corrective actions are completed within the specified timelines and meet required safety standards.5.5. Document and report progress of corrective actions, highlighting any challenges or delays in implementation.5.6. Verify that corrective actions are aligned with regulatory and compliance standards for electrical systems.5.7. Conduct follow-up inspections and tests to assess the continued effectiveness of corrective measures.5.8. Collaborate with relevant stakeholders to resolve any issues arising from the implementation of corrective actions.5.9. Provide recommendations for further improvements or adjustments based on the monitoring and evaluation process.
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LICQ2200175 – 6: Performance Monitoring and Continuous Improvement in Electrical Systems

The aim of this unit is to provide learners with a comprehensive understanding of performance monitoring and continuous improvement principles in electrical systems. Learners will explore the use of performance metrics and indicators to evaluate system efficiency and effectiveness, as well as the application of monitoring tools like SCADA and data logging. The unit also focuses on designing strategies for continuous improvement to optimize system performance and assessing the impact of these initiatives on reliability, efficiency, and sustainability.

Learning Outcome:	1. Understand the principles of performance monitoring and continuous improvement in electrical systems.
Assessment Criteria:	<ol style="list-style-type: none"> 1.1. Identify the key principles of performance monitoring in electrical systems. 1.2. Describe the purpose and benefits of continuous improvement in electrical systems. 1.3. Explain the various techniques used to monitor performance in electrical systems. 1.4. Evaluate how performance monitoring contributes to system reliability and efficiency. 1.5. Analyze the role of data collection and analysis in identifying performance issues. 1.6. Discuss the impact of regular performance reviews on system maintenance and upgrades. 1.7. Identify common challenges in monitoring electrical systems and propose solutions. 1.8. Assess the importance of integrating continuous improvement strategies into system management. 1.9. Demonstrate an understanding of industry standards and regulations related to performance monitoring and continuous improvement in electrical systems.
Learning Outcome:	2. Apply performance metrics and indicators to assess the efficiency and effectiveness of electrical systems.
Assessment Criteria:	<ol style="list-style-type: none"> 2.1 Demonstrate the ability to identify and select appropriate performance metrics for assessing electrical systems based on project requirements and industry standards. 2.2 Apply key performance indicators (KPIs) to evaluate the operational efficiency of electrical systems in different contexts. 2.3 Calculate and interpret system performance data to assess the effectiveness of electrical components and equipment. 2.4 Utilize industry-standard tools and methods to measure and analyze the performance of electrical systems. 2.5 Compare actual system performance with established benchmarks or targets to identify areas for improvement. 2.6 Conduct detailed assessments of electrical systems, considering factors such as energy consumption, reliability, and operational costs. 2.7 Propose adjustments or modifications based on performance assessments to improve system efficiency and effectiveness. 2.8 Document performance metrics and assessments in compliance with industry standards, ensuring clarity and accuracy.

	2.9 Evaluate the effectiveness of performance indicators in achieving desired outcomes and ensuring continuous improvement in electrical system performance.
Learning Outcome:	3. Evaluate the use of monitoring tools and techniques (e.g., SCADA, data logging) to track system performance.
Assessment Criteria:	<p>3.1 Demonstrate an understanding of the various monitoring tools and techniques used in system performance tracking, including SCADA and data logging.</p> <p>3.2 Analyze the key features and functions of SCADA systems in monitoring and controlling operational processes.</p> <p>3.3 Evaluate the role of data logging in collecting and storing performance data for future analysis and troubleshooting.</p> <p>3.4 Compare the effectiveness of different monitoring tools in various system types and operational environments.</p> <p>3.5 Assess the accuracy and reliability of data provided by SCADA and data logging systems in real-time performance monitoring.</p> <p>3.6 Evaluate the integration of monitoring tools with other system management and control systems for enhanced performance tracking.</p> <p>3.7 Identify the benefits and limitations of SCADA and data logging techniques in relation to system efficiency and operational decision-making.</p> <p>3.8 Recommend appropriate monitoring tools based on system requirements, performance goals, and industry standards.</p> <p>3.9 Critically assess the impact of real-time data analysis from monitoring tools on overall system optimization and maintenance strategies.</p>
Learning Outcome:	4. Design strategies for continuous improvement to optimize the performance of electrical systems.
Assessment Criteria:	<p>4.1 Identify the key components of electrical systems that influence overall performance and efficiency.</p> <p>4.2 Analyze current performance levels of electrical systems to identify areas for improvement.</p> <p>4.3 Research and evaluate industry best practices for continuous improvement in electrical systems.</p> <p>4.4 Develop a clear and actionable strategy for optimizing system performance based on analysis and research.</p> <p>4.5 Integrate appropriate technological tools and techniques to enhance electrical system performance.</p> <p>4.6 Consider cost, sustainability, and compliance with safety standards in the development of improvement strategies.</p> <p>4.7 Assess the potential impact of proposed strategies on system reliability and long-term performance.</p> <p>4.8 Implement a monitoring plan to track the effectiveness of improvement strategies over time.</p> <p>4.9 Recommend adjustments to the strategy based on feedback, performance data, and ongoing analysis.</p>
Learning Outcome:	5. Assess the impact of continuous improvement initiatives on system reliability, efficiency, and sustainability.

<p>Assessment Criteria:</p>	<ul style="list-style-type: none"> 5.1 Evaluate how continuous improvement initiatives contribute to system reliability by identifying improvements in performance and consistency over time. 5.2 Analyze the relationship between continuous improvement practices and the enhancement of system efficiency, highlighting key areas where productivity has been increased. 5.3 Assess the influence of continuous improvement on sustainability, including resource management, waste reduction, and long-term environmental impacts. 5.4 Measure the effectiveness of specific continuous improvement initiatives using key performance indicators (KPIs) related to system performance and operational efficiency. 5.5 Identify the challenges faced during the implementation of continuous improvement initiatives and their impact on system reliability. 5.6 Examine case studies or real-world examples where continuous improvement initiatives have successfully enhanced system reliability, efficiency, and sustainability. 5.7 Recommend strategies for integrating continuous improvement into existing systems to achieve higher levels of reliability, efficiency, and sustainability. 5.8 Discuss the role of stakeholder engagement and collaboration in the successful implementation of continuous improvement initiatives. 5.9 Critically evaluate the long-term benefits and potential risks associated with continuous improvement strategies in maintaining system reliability and efficiency.
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