T Level Technical Qualification in Maintenance, Installation and Repair for Engineering and Manufacturing

Maintenance Engineering Technologies: Electrical and Electronic Occupational Specialism (8712-313)

Practical Assignment

SAMPLE Assessor Pack

September 2025 Version 3.0

Version and date	Change detail	Section
1.0 September 2022	First Published Version	
2.0 April 2024	Demonstration of system functionality moved from Task 4 to Task 2, including the requirement of an assessor observation.	Task specific guidance, Task 2 and Task 4. Marking grids – Assessment Themes – Systems and components, Working with faults, Reviewing and reporting.
	Recommended assessor to candidate ratios reduced to 3.	General task guidance
	Additional guidance regarding restricting the use of and access to systems prior to system demonstration.	Task Specific Guidance Centre Guidance
2.1 February 2025	Reset page numbers	Contents page
3.0 September 2025	Refinement of layout and formatting Removal of duplicated guidance information	All 1. Assessment 2. Tasks

Contents

1. Assessment

The assessment for Maintenance Engineering Technologies: Electrical and Electronic Engineering Occupational Specialism component consists of a practical assignment, which includes an assignmentbrief and then a number of tasks for the candidate to complete. Tasks are assessed by assessment themes that cover a range of knowledge and skills from the performance outcomes. They are designed to allow judgement of the candidate to be made across different categories of performance.

The assessment for this component has been allocated a set number of marks against each assessment theme, based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

The live Occupational Specialism assessment materials must be used in conjunction with the 'TQ Occupational Specialism Assessment Process Guide', available on the T Levels Resource Hub.

Performance outcomes

The weightings for each performance outcome (PO) will remain the same for every version of the practical assignment. This ensures the appropriate depth and breadth of knowledge and skills for each specialism can be reliably assessed in every version and meets the needs of industry while keeping comparability between each assessment over time.

Performance outcome	Typical knowledge and skills	Weighting
PO2 Analyse requirements, specifications and technical information to enable the delivery of successful maintenance, installation, servicing and repair of electrical and electronic technology, systems and equipment.	Interpret requirements of a brief through the analysis and interrogation of available information sources and formats, including technical representations. Consider all relevant aspects of a brief challenging and confirming expectations including risks. Select and use techniques and technologies that will assist in the analysis of information available.	10%
PO3 Plan and prepare the maintenance, installation, servicing and repair of electrical and electronic technology, systems and equipment, taking into account the specific requirements and context.	Plan to meet the requirements of a brief effectively with consideration of required resources and technology. Identify and mitigate potential issues prior to maintenance, installation, servicing and repair activities through risk assessment and management. Prepare the work area, including required tools and equipment for maintenance, installation, servicing and repair activities.	20%
PO4 Perform relevant maintenance, installation, servicing and repair of electrical and electronic technology, systems, and equipment, using appropriate techniques and procedures to achieve the required quality outcomes and solutions.	Maintain, install and repair electrical and electronic systems, equipment, and components. Use diagnostic and measurement techniques, tools and equipment safely and efficiently. Locate faults and carry out maintenance activities efficiently. Remove, repair and replace components in line with best practice to complete maintenance, installation, servicing and repair tasks. Re-commission and return electrical and electronic systems to service, and reinstate the work area following maintenance, installation, servicing and repair activities.	40%
PO5 Review and evaluate activities to help improve workplace systems and processes associated with maintenance, installation, servicing and repair of electrical and electronic technology, systems, and equipment, demonstrating commercial awareness and accountability.	Deal with issues and problems quickly and efficiently, escalate issues in line with correct lines of reporting. Monitor work to ensure efficiency, and safety at all times. Carry out quality monitoring and assurance checks to review processes. Make positive contributions when responding constructively to feedback from others.	20%
PO6 Communicate electrical and electronic maintenance, installation, servicing and repair information, proposals and solutions, producing, recording and explaining relevant technical information.	Record and amend technical information, data, risks and issues to support maintenance, installation and repair activities. Use different techniques to communicate technical information effectively with consideration of audience and format, and complete handover procedures.	10%

2. Task guidance

General task guidance

Read **ALL** information carefully before the assessment.

The following documents, available on the City & Guilds website, provide essential generic guidance for providers delivering T level Technical Qualifications (TQs) and **must** be referred to alongside this guidance:

- **T level Technical Qualifications – Teaching, Learning and Assessment Guide**
- **TQ Occupational Specialism Assessment Process Guide**

Ensure you are familiar with the following documentation before you undertake the assessment of candidates:

- Assessor observation template
- Peer Review (PR) form (where applicable)
- Templates provided for tasks (where applicable)
- Marking grids

All work carried out should be to industry standards, undertaken in a safe manner and compliant with relevant regulations. If a candidate fails to carry out the activities in a safe manner, the assignment should be suspended until this aspect is corrected.

This assignment is designed to require the candidate to make use of their knowledge, understanding and the practical skills they have built up over the course of their learning to tackle tasks, problems and/or challenges. This approach to assessment emphasises to candidates the importance and applicability of the full range of their learning to practice in their industry area. It supports them in learning to take responsibility for transferring their knowledge, understanding and skills to the practical situation, fostering independence, autonomy and confidence.

During the learning programme, it is expected that tutors will have taken the opportunity to set shorter, formative tasks that allow candidates to be supported to independently use the learning they have so far covered, drawing this together in a similar way, so they are familiar with the format, conditions and expectations of the assessment.

Candidates should be made aware during learning what the assessment themes are and how they are implemented in marking the assignment, so they will understand the level of performance that will achieve them high marks.

Candidates should not be entered for the assessment until the end of the course of learning for the qualification, so they are in a position to complete the assessment successfully.

Health and safety
Candidates must not be entered for assessment without being clear of the importance of working safely and having attended sufficient practical training to be able to work safely. The assessor must immediately stop an assessment if a candidate works unsafely. At the discretion of the assessor, depending on the severity of the incident, the candidate may be given a warning. However, if they continue to work unsafely, risking the safety of themselves or others, their assessment must be ended, and they must retake the assessment in a future series after significant further training has taken place. Any warnings issued to a candidate must be considered as part of the marking process and recorded on the candidate record form (CRF). Any actions that have led to that warning must be detailed on the CRF so they can be considered along with the other evidence when applying the descriptors in the mark scheme.

Compliance with timings
Due to the nature of this assessment, the maximum time allowances provided must be adhered to. They refer directly to assessment time, not to any additional setting up times the provider needs to create an appropriate assessment environment.

It is the provider's responsibility to plan sufficient assessment sessions as stated in each of the tasks, under the appropriate conditions, within the assessment window, to allow candidates reasonable time to complete the assessment tasks.

Where candidates are required to plan their work, they should have their plans confirmed for appropriateness in relation to the time allocated for each task, to ensure their planning has not left them with too short a time to complete the tasks safely. Any planning that is not appropriate must be recorded on the CRF as part of the marking process.

Candidates should be allowed sufficient time to fully demonstrate the range of their skills, however this also needs to be reasonable and practicable. Candidates should be allowed to overrun their own planned timings in order for evidence of a range of their skills to be captured. If, however, the time required exceeds the maximum time allowance for the task, the provider must stop the assessment and base the marking on the evidence up to that point.

Assessor candidate ratios
Where the tutor/assessor is required to carry out observation of performance, detailed, descriptive notes must be recorded on the assessor observation form provided. The provider has the flexibility to adapt the form to suit local requirements (e.g. to use electronic and hand-written formats) as long as this does not change or restrict the type of evidence collected.

The number of candidates an assessor will be able to observe at one time will vary depending on local conditions:

- monitoring and maintaining safety during assessment
  - any specific hazards related to the task that pose a risk of harm in relation to the competence of the candidates
  - the availability of supervisory staff to support the assessor
- the practicalities of collecting evidence
  - the complexity of evidence collection for the task
  - whether there are any peak times during which there is a lot of evidence to collect that will require additional support or any periods that are quieter which may be eased through staggered starts, etc.
  - local conditions, for example:
    - layout of the assessment environment and sufficient assessor line of sight to task activity throughout the assessment period
    - amount of additional support available (e.g. to capture image/video evidence)
    - availability of suitable workspaces/bays or of shared resources and equipment.

Providers are advised to trial the planned arrangements during formative assessment, reviewing the quality of evidence captured and manageability. It is expected that for straight forward observations, with favourable local conditions and support, (and unless otherwise specified) no more than six candidates will be observed by a single assessor at one time, and the number will usually be fewer than this maximum. The key factors to consider are the logistics of collecting sufficient evidence and the candidates' ability to remain working safely in the assessment environment.

A timetable of assessments and layout of the workspaces must be available for the moderator on request. This should detail:

- the candidates being assessed at each workstation,
- the assessor(s) and
- support staff present

Time

The time allocated for the completion of the tasks and production of evidence for this assessment is **22 hours**. Timings for completion of specific tasks are outlined below.

- Task 1 – 5 hours
- Task 2 – 11 hours
- Task 3 – 5 hours
- Task 4 – 1 hour.

General task requirements

- The assignment brief and any associated documents should be released to candidates at the start of the first scheduled task assessment. Candidates should be provided with 30 minutes of non-assessed time at the start of this session to read and review the brief, before being given the first task. It **must** be made clear to candidates when the 30 minutes of non-assessed reading and review time starts and ends.
- Each task **must** only be released to candidates at the start of the scheduled assessment session for that individual task.
- Each task will provide details of the evidence that must be submitted upon the completion of the task. Any additional evidence which must also be submitted will be detailed within the task.
- Candidates should be advised that approximate word counts, or numbers of pages have been included within the task guidance in order to act as a guide to support the completion of the tasks. These are intended as a guide only, and there will be no penalisation of marking based on word count or number of pages that is above or below the indicative guidance provided.
- Candidates are **not** permitted to bring any existing notes or materials completed prior to the assessment into any of the assessment sessions.
- Candidates **must** be reminded that their work submitted, including drawings, sketches and calculations are legible and appropriately labelled with their name and the task reference. Evidence can be either word processed or handwritten. Any electronic evidence produced must have a clear file name and easily identifiable to the task and candidate.
- Candidates are permitted to have copies of their final evidence from previous tasks in subsequent assessment sessions. The use of this evidence is solely to support candidates to refer to previous work. The purpose of only providing copies is to ensure that candidates are unable to rework any of their previous responses.
- When working under supervised conditions for longer sessions, breaks can be facilitated outside of the controlled conditions. In these instances, the room **must** be kept locked and all candidates **must** have vacated once the break begins. All materials **must** be kept securely during the break.
- If the task completion runs over more than one session, candidates **must** be reminded that no assessment information can be shared or discussed with other candidates.
- Candidates **must** be made aware that plagiarism is not allowed.
- Candidates **must** be made aware of City & Guilds position on the use of Artificial Intelligence (AI) - see Position Statement on AI | City & Guilds
- Where evidence is created using software which has the potential for cloud-based retrieval or sharing this feature should be disabled where possible (e.g. in software settings or through restriction of internet connection). Where not possible, candidates must be reminded that the evidence submitted for the tasks can only be generated within the scheduled assessment times and also of the implications of sharing or plagiarising from cloud-based content.
- After the production of evidence, both the assessor and candidate must sign declarations of authenticity.
- Where the candidate or assessor is unable to or does not confirm authenticity through signing a declaration form, the work will not be accepted and a mark of zero will be given. If any question of authenticity arises, the Provider may be contacted for justification of authentication

Task specific instructions

Each task should be administered separately and in order unless instructions state otherwise, and each task should be completed and submitted by all candidates before moving onto the next.

Where a candidate is required to update or refer to a document from a previous task, the document provided to them should be a copy of the original submitted evidence. This can be a hard copy or electronic. Candidates must not be permitted access to their original document from previous task, this is to prevent candidates reworking submitted evidence. Any annotations or amendments to the copy should be made in a different colour text or tracked electronically (e.g. tracked changes) for marking and moderation purposes and saved in a secure location with an appropriate file name.

Providers are not permitted to supply candidates with templates e.g. risk assessment for any task unless specified.

The system provided must meet the requirements detailed in the brief.
The system and circuitry provided must have **four** faults built into it for candidates to diagnose and repair. These must be as follows:

- faulty transformer due to insulation failure caused by mechanical stress
- a shorted diode within the rectifier block of the system
- a failed filter capacitor
- an incorrect voltage regulator has been fitted providing too low an output voltage for the specified system.

Note, for live assessment, a larger range of comparable faults will be indicated in this section of the guidance, from which four must be built into the system and circuity for each candidate to diagnose and repair. Where there is the potential for candidates to be taking the practical tasks at different times, then the faults provided should be rotated to ensure that these candidates are presented with a different selection of faults to detect.

Resources are specified through centre resource list in advance of the assessment but will not be made available to students as this will lead students to know the faulty components. Candidates will have access to the workshop/tool cupboard to select resources rather than a list and the required resources are dictated by the guidance and brief.

Task 1 – Plan and prepare for the maintenance activities

Assessor guidance

- Candidates must be provided with all relevant technical documentation for the system they will be working on, including the current maintenance and service schedule.
- Where these documents are digital copies, they must be downloaded and saved for the candidates to access **without** the need to access the internet.

Evidence

- a list of requirements and resources required, including justification for the selections
- completed risk assessment
- method statement.

Resources

- access to relevant information sources (digital or hard copy), including figures 1 and 2, wiring diagrams, component datasheets, manufacturers specification, manufacturers recommended procedures, operation and maintenance manuals, technical manuals and circuit diagrams, technical drawings, schematics
- an appropriate AC to DC power conversion system and electrical supply
- the working area to complete relevant risk assessment
- a range of materials, components and consumables to select from, including PPE
- measurement, fault diagnosis and test equipment, including multimeters, oscilloscopes, signal generators and diagnostic testers
- relevant tools for disassembly, re-assembly and repair, including insulated tools, drills, pliers, wire cutters, wire strippers, soldering iron, de-soldering tools, screwdrivers, and crimping tools
- appropriate ICT equipment and software.

Task 2 – Perform the maintenance activities

Assessor guidance

- All relevant health and safety procedures, including safe isolation, must be observed at all times. If a candidate acts in a way that is likely to endanger themselves or others the assessment must be stopped immediately.
- Work area must be representative of normal centre practice prior to any practical activities taking place for candidates to complete their work area preparation.
- Candidates must have access to the workshop/tool cupboard for any additional tools, equipment and components not previously selected in Task 1, which candidates are then able to annotate on their method statement with any changes to their original plans.
- No one other than the candidate should interact with the system during the 11 hour period of Task 2.
- As part of Task 2, candidates must carry out the return to service and demonstrate the system functionality with the assessor taking the part of the supervisor, which must take place on-site so the candidate is able to demonstrate the system functionality.

Evidence

- completed test record sheets
- updated maintenance records and control documents
- annotated method statement, including any recommendations for further investigation if required.
- assessor observations of the work area preparation
- assessor observations of the maintenance activities
- assessor observation of system functionality demonstration.

To support the comments made within the Practical Observation the assessor must capture the following photographs that must be submitted as supporting evidence for each candidate.

Photographic evidence which shows:

- the prepared work area
- the working area after disassembly
- faulty components prior to repair or replacement, clearly showing the cause of each fault
- replaced or repaired components in situ, including any solder joints or other connections made
- the re-instated work area.

Resources

- copies of completed planning documentation from Task 1
- access to relevant information sources (digital or hard copy), including Figures 1 and 2, wiring diagrams, component datasheets, manufacturers specification, manufacturers recommended procedures, operation and maintenance manuals, technical manuals and circuit diagrams, technical drawings, schematics
- an appropriate AC to DC power conversion system and electrical supply
- working area
- appropriate PPE
- a range of materials and consumables
- a range of relevant tools and equipment for maintenance and repair
- a range of appropriate measurement, fault diagnosis, test and calibration equipment
- appropriate components to replace faulty items, including wiring and transmitters
- appropriate ICT equipment and software.

Task 3a – Review and report the maintenance activities

Assessor guidance

Candidates are expected to write a technical report covering all aspects of the maintenance and repair activities and are guided with a typical word count of 850 words.

Evidence

- a technical report
- revised maintenance schedule, including justifications.

Resources

- copies of completed documentation from Tasks 1 and 2
- access to relevant information sources (digital or hard copy), including Figures 1 and 2, wiring diagrams, component datasheets, manufacturers specification, manufacturers recommended procedures, operation and maintenance manuals, technical manuals and circuit diagrams/schematics
- appropriate ICT equipment and software.

Task 3b – Peer review

Assessor guidance

- All candidates must complete a peer review task.
- A template to provide peer review feedback will be given to ensure a reliable and comparable level of feedback is obtained for each candidate.
- Each candidate should carry out up to a maximum of two peer reviews on different revised maintenance schedules in order to provide feedback to the candidate for them to reflect on and respond to.
- In a separate session, each candidate should receive two completed peer review feedback forms that have been checked by the assessor for their revised maintenance schedule.
- The peer review feedback forms must be submitted to support marking.
- All candidates providing peer review feedback must be at the same stage in the assessment process as the candidate they are providing feedback to (i.e. they must have already completed the practical elements of Tasks 2 and 3a).

Evidence

- completed peer review forms.
- maintenance schedule amended from peer review feedback, including justifications.

Resources

- copies of completed documentation from Tasks 1, 2 and 3a
- two completed peer review forms for each candidate
- access to relevant information sources (digital or hard copy), including Figures 1 and 2, wiring diagrams, component datasheets, manufacturers specification, manufacturers recommended procedures, operation and maintenance manuals, technical manuals and circuit diagrams/schematics
- appropriate ICT equipment and software.

Task 4 – Complete handover

Assessor guidance

- Candidates must carry out the handover procedures with the assessor taking the part of the client. This is likely to be a desk-based activity given the system functionality was demonstrated at the end of Task 2.
- The assessor must not ask any questions or prompt the candidate at any point in this meeting.
- The meeting should be recorded on video for the assessor to refer back to when completing the Practical Observation form and submit as evidence.
- The video recording should be a maximum of 30 minutes.

Evidence

- handover documentation.
- assessor observations of the handover meeting.

To support the comments made within the Practical Observation the assessor must capture the following video evidence that must be submitted as supporting evidence for each candidate.

Video evidence which shows:

- handover meeting with the client, maximum 30 minutes.

Resources

- copies of completed documentation from Tasks 1, 2 and 3, including the two completed peer review forms
- access to relevant information sources (digital or hard copy), including Figures 1 and 2, wiring diagrams, component datasheets, manufacturers specification, manufacturers recommended procedures, operation and maintenance manuals, technical manuals and circuit diagrams/schematics
- the AC to DC power conversion system maintained in Task 2 and electrical supply to suit the needs of the system to demonstrate system functionality, no further changes should be made to the system at this point.

3. Marking

Guidance on marking

Please refer to the **TQ Occupational Specialism Assessment Process Guide** for further information on gathering evidence suitable for marking and moderation, and on using the marking grid and forms.

The Candidate Record Form (CRF) is used to record:

- details of any guidance or the level of prompting the candidate has received during the assessment period
- rough notes bringing together relevant evidence from across tasks during marking
- summary justifications when holistically coming to an overall judgement of the mark for each performance objective and overall
- if an assessment has to be stopped on the grounds of health and safety or if a candidate has been working in an unsafe manner.

The Assessor Observation form is used to record:

- descriptive information and evidence of candidate performance during an observation.

4. Marking grid

There is a marking grid for each assessment theme that must be assessed as part of this occupational specialism assessment. The individual statements within the band descriptors should be treated together, and not separately, to make one whole descriptor.

Assessment theme - Health and safety

Guidance for assessors
Evidence from Tasks 1, 2, 3a and 4 should be used to assess performance against this assessment theme.

Task 1

- a list of requirements and resources, including justifications for the selections
- completed risk assessment
- method statement.

Task 2

- updated maintenance records and control documents
- annotated method statement, including any recommendations for further investigation if required.
- assessor observations of the work area preparation
- assessor's observations of the maintenance activities
- photographic evidence of:
  - the prepared work area
  - the working area after disassembly.

Task 3a

- technical report.

Task 4

- assessor observations of handover meeting
- video evidence showing the handover meeting with the client.

Note: where there is insufficient evidence to award a mark, a	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks per assessment theme

zero mark must be given					
	Indicative content: Identification of risks and hazards that if not controlled could cause injury to themselves or others, that may include: • low risk - slips, trips and falls, cuts and abrasions, irritants • medium risk – burns, scalding and fumes • high risk - stored energy, electrocution and malfunction. Analysis of risk with appropriate mitigation and control measures prepared against hazards for planned tasks, including PPE. Assessment of risk as part of planning and preparing for maintenance and repair activities, including health and safety related preparatory checks on tools, equipment and the work area. Safe isolation procedures completed accurately and safely (**Failure to complete all steps of safe isolation as specified below leading to an unsafe situation the assessment will be stopped immediately**): • obtain permission to start work • prove that the approved voltage indicator is functioning correctly • identify the source(s) of supply using an approved voltage indicator • isolate the supply and lock out tag out (LOTO) • prove the system/equipment is DEAD using an approved voltage indicator • put up warning signs to tell other people that the electrical installation has been isolated • once the system/equipment is proved DEAD, work can begin. Safe working practices applied throughout inspection and testing, disassembly, reassembly, replacement and modification of components, systems and sub-systems, including: • work area to be kept tidy throughout the tasks, and left in safe condition once completed, returning tools and equipment to correct storage facilities • wears the correct PPE at all times, as identified in their risk assessment and/or list of requirements and resources, including anti-static clothing, safety glasses, workwear, boots and gloves **(correct PPE must be worn at all times. If unsafe working occurs the assessment is to be stopped immediately)** • following health and safety regulations, legal requirements and procedures (components, stored energy, safe removal). Technical report acknowledges the application of health and safety procedures throughout practical activities, evaluating the effectiveness of planned control measures and suggest improvements to future health and safety planning.				

Marks per band	1-4	5-8	9-12	N/A	12
	Risk assessment covers the **majority** of risk factors and **some** control measures have been identified. Likelihood or severity has been considered for **some** risks and hazards.	Risk assessment covers a **good range** of risk factors, including risk control measures identified for most of the potential risks and hazards. Likelihood and severity has been considered for **most** risks and hazards.	Risk assessment is detailed and clearly identifies **all** of the associated risk factors, risk control measures and have been clearly identified for **all** potential risks and hazards. Likelihood and severity has been considered for **all** risks and hazards.		
	Some relevant potential safety issues considered as part of preparatory checks and planning activities, including all steps of safe isolation procedures.	**Most** relevant potential safety issues considered as part of preparatory checks and planning activities, including all steps of safe isolation procedures.	**All** relevant potential safety issues **fully** considered as part of preparatory checks and planning activities, including **all** steps of safe isolation procedures.		
	Works safely during all practical activities, following all relevant safety procedures, but when working **some low risk hazards** were missed that did not result in any accident or injury.	Works safely during all practical activities, following all relevant safety procedures, with **most** risks and hazards that occur during the tasks **correctly mitigated against as they arise**.	Works safely during all practical activities, following **all** relevant safety procedures, with **all** risks and hazards that occur during the tasks **correctly prepared for and mitigated against as they arise**.		
	Work area left in safe condition, **some** tools and equipment **not** returned to correct storage facilities, disposal of waste was carried out but with **limited** reference to disposal requirements and waste regulations.	Work area left safe, clean and tidy, with **most** tools and equipment returned to correct storage facilities, disposal of waste was carried out but with **some** reference to disposal requirements and waste regulations.	Work area returned to **original condition** with **all** tools and equipment returned to correct storage facilities, disposal of waste was carried out taking into account **all** of the disposal requirements and waste regulations.		

	Minimal health and safety considerations have been included as part of reviewing, reporting or handover.	A **good** range of health and safety considerations have been included as part of reviewing, reporting and handover.	A **comprehensive** range of health and safety considerations have been included as part of reviewing, reporting and handover.		

Assessment theme – Planning and preparation

Guidance for assessors
Evidence from Tasks 1 and 2 should be used to assess performance against this assessment theme.

Task 1

- a list of requirements and resources, including justifications for the selections
- method statement.

Task 2

- assessor observations of the work area preparation
- photographic evidence of the prepared work area.

Note: where there is insufficient evidence to award a mark, a zero mark must be given	**Band 1 descriptor**	**Band 2 descriptor**	**Band 3 descriptor**	**Total marks per sub assessment theme**	**Total marks for assessment theme**
	Indicative content: Planning: • technical documentation relevant to the system gathered, prepared and analysed, including manufacturers specifications, operation manuals, maintenance schedule and records, and electrical representations (schematics, wiring diagrams and block diagrams) to plan and prepare for maintenance activities • detailed method statement of how the task will be carried out in a logical manner with justifications and reasoning to support methods given using correct technical terminology • list of the appropriate requirements and resources for the system provided, including tools and equipment, materials, components and consumables, wastage and disposal requirements, time needed to carry out the activity, fault diagnosis methods to be used and any access requirements				

	○ components – transformers, diodes, capacitors, voltage regulator ICs and sockets, power supplies ○ tools and equipment – drivers, spanners, pliers, soldering irons, de-soldering tools, wire cutters, wire strippers, crimping tools, test and calibration equipment, multimeters, oscilloscopes, diagnostic testers, signal generators ○ materials and consumables – wiring, insulation, solder, connectors and fasteners, PPE. Preparation: • appropriate materials, components and resources selected and prepared for the system, type and scope of the tasks, serviceability and working condition to complete the tasks in a timely manner • preparatory checks completed for tools and equipment (including calibration), obtaining permits to work, isolation requirements, work area, sensory, specifications, test dates (PAT test, calibration, electrical safety) • work area prepared logically in accordance with SOPs, with list of resources and requirements, calibrated tools and equipment on hand, manufacturers specifications and workplace requirements.				
Marks per band	**1-3**	**4-6**	**7-9**	**9**	**18**
Planning	**Limited** analysis of **some** technical documentation relevant to the system, covering **some** factors appropriate to the brief in limited detail.	Analysis of **most** technical documentation **relevant to the system,** covering **most** factors appropriate to the brief in some detail.	**Thorough** analysis of **all** technical documentation relevant to the system, covering **all** factors appropriate to the brief in comprehensive detail.		
	Method statement shows **some** consideration of scope, processes, tools and equipment, but **may not be in a logical sequence** or **difficult to follow**, using **some** relevant technical terminology but **not always** accurately.	Method statement shows **clear** consideration of scope, processes, tools and equipment, which is **mostly in a logical order** and **can be followed**, using **some** relevant technical terminology **accurately**.	Method statement shows **full** consideration of scope, processes, tools and equipment, which is **fully logical** and can be **easily followed** by a third party, using **relevant** and **accurate** technical terminology **throughout**.		

	Limited list of resources and requirements, including relevant technical documentation, with **limited** justifications.	**Most** resources and requirements are listed, including technical documentation, with **some** justifications for **most**, or full justifications for **some**.	**Comprehensive** list of all resources and requirements, including technical documentation, with **full** justifications for **all**.		
Marks per band	**1-3**	**4-6**	**7-9**	**9**	
Preparation	**Limited** range of materials, components and resources selected with **some consideration** of working condition, serviceability, or feasibility.	A **good** range of materials, components and resources selected with **some evaluation** of working condition, serviceability and feasibility.	A **comprehensive** range of materials, components and resources selected with **detailed evaluation** of working condition, serviceability and feasibility.		
	Minimal consideration for the condition, quality and performance of tools and equipment through completing **limited** preparatory checks.	**Clear** consideration for the condition, quality and performance of tools and equipment through completing a **good** range of preparatory checks.	**Thorough** consideration for the condition, quality and performance of tools and equipment through completing a **comprehensive** range of preparatory checks.		
	Work area prepared with **some** consideration of the prepared method statement and workflow, with calibration checks completed on **limited** tools and equipment.	Work area prepared with **clear** consideration of the prepared method statement and workflow, with completed calibration checks on **most** selected tools and equipment.	Work area prepared with **full** consideration of the prepared method statement and workflow, with calibration checks completed on **all** selected tools and equipment.		

Assessment theme – Systems and components

Guidance for assessors
Evidence from Tasks 1, 2 and 3a should be used to assess performance against this assessment theme.

Task 1
- a list of requirements and resources, including justifications for the selections
- method statement.

Task 2
- completed test record sheets
- updated maintenance records and control documents
- annotated method statement, including any recommendations for further investigation if required
- assessor observations of the maintenance activities
- assessor observation of the working area reinstatement
- assessor observation of system functionality demonstration
- photographic evidence of replaced or repaired components in situ, including any solder joints or other connections made.

Task 3a
- technical report.

Note: where there is insufficient evidence to award a mark, a zero mark must be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme

	Indicative content:
	Inspection and testing:
	• a variety of inspection and testing methods applied to the system:
	  ○ functional testing – measurement of electrical and electronic parameters, full system and sub-system functionality
	  ○ sensory inspection – visual, auditory, touch, smell
	  ○ electrical testing – voltage, current, resistance, power, characteristics of signal waveforms
	• appropriate test equipment used accurately – multimeters, diagnostic testers, oscilloscopes, signal generators
	• test record sheets to show:
	  ○ manufacturers specification compared with actual results				

	○ set parameters and tolerances using correct units and calculations, including voltage, current, resistance and power ○ discrepancies identified and explained where found. Disassembly and re-assembly: • procedures to follow: ○ decommissioning – isolation, discharge time, removal of systems and sub-systems, removal of components, disconnection of wires and cables ○ commissioning – connection of wires, cables and PCBs, installation of components, installation of sub-systems, powering up, connectivity checks, test before first use ○ return to service – final system checks, functional tests • quality monitoring and assurance checks and measures: ○ post-repair performance checks ○ checking and validating reliability and durability – soldered joints are secure and correctly shaped, screw connections are tightened, correctly matched crimps and wires, no exposed wiring or connections, appropriate circuit protection methods used, cables are insulated, polarised components connected the correct way around • re-instatement of the work area following procedures: ○ waste disposal – legal and regulatory requirements followed, wiring in the WEEE bin, recycling of materials where possible, non-recyclable materials to general waste bin ○ tools and equipment cleaned and returned to appropriate storage areas ○ clean and tidy the working areas.				
Marks per band	**1-4**	**5-8**	**9-12**	**12**	**24**
Inspection and testing	**Some** understanding and application of inspection and testing methods shown through selection and completion, using suitable test and measurement equipment, which **may not be set up correctly**.	**Good** understanding and application of inspection and testing methods shown through the selection and completion, using suitable test and measurement equipment, set up correctly **within tolerance**.	**Comprehensive** understanding and application of inspection and testing methods through the selection and completion, using suitable test and measurement equipment, set up correctly and **with precision**.		
	Basic interpretation and application of **some** parameters or tolerances. **Some** units of measurement and calculations used appropriately, but with **limited accuracy**.	**Clear** interpretation and application of **some** parameters and tolerances. **Most** units of measurement and calculations used appropriately with **some accuracy**.	**Comprehensive** interpretation and application of **all** parameters and tolerances. **All** units of measurement and calculations used appropriately and **accurately**.		

	Some outputs, data or readings compared with manufacturer's specifications with discrepancies not always identified, following **some** recording procedures.	**Most** outputs, data and readings compared with manufacturer's specifications with any discrepancies identified, following **most** recording procedures.	**All** outputs, data and readings compared with manufacturer's specifications with any discrepancies identified and explained, following **all** recording procedures.		
Marks per band	**1-4**	**5-8**	**9-12**	**12**	
Disassembly and re-assembly	Disassembly and re-assembly procedures (including decommissioning, commissioning and return to service) are carried out with **some** accuracy, and measures to ensure reliability and durability.	Disassembly and re-assembly procedures (including decommissioning, commissioning and return to service) are carried out with some levels of accuracy and efficiency, with **most** measures to ensure reliability and durability.	Disassembly and re-assembly procedures (including decommissioning, commissioning and return to service) are carried out with high levels of accuracy and efficiency, with **comprehensive** measures to ensure reliability and durability.		
	Use **relevant** tools and equipment, adequately throughout disassembly and re-assembly activities, with **limited** consideration for accuracy.	Use a **range of relevant** tools and equipment, appropriately throughout disassembly and re-assembly activities, with **some consideration** for accuracy and efficiency.	Use **all** tools and equipment, appropriately throughout disassembly and re-assembly activities, with **full consideration** for accuracy and efficiency.		
	Working area **partially** re-instated following some procedures, including **some** waste managed appropriately and disposed of with **limited** consideration of requirements.	Working area **mostly** re-instated following **most** procedures, including waste managed appropriately and disposed of with **some consideration** of requirements.	Working area **fully** re-instated following **all** procedures, including waste managed appropriately and disposed of with **full consideration** of requirements.		

Assessment theme – Working with faults

Guidance for assessors
Evidence from Task 2 should be used to assess performance against this assessment theme.

Task 2

- completed test record sheets
- updated maintenance records and control documents
- annotated method statement, including any recommendations for further investigation if required
- assessor observations of the maintenance activities
- assessor observation of system functionality demonstration
- photographic evidence of faulty components prior to repair or replacement, clearly showing the cause of each fault.

Note: where there is insufficient evidence to award a mark, a zero mark must be given	Band 1 descriptor	Band 2 descriptor	Band 3 descriptor	Total marks per sub assessment theme	Total marks for assessment theme
	Indicative content: Detection and diagnosis: • fault detection and diagnostic techniques – self-diagnosis, unit substitution, input output, half split technique, 6 point technique, sensory checks • faults to be found - faulty transformer due to insulation failure, shorted diode within the rectifier block of the system, failed filter capacitor, incorrect voltage regulator fitted providing too low an output voltage for the specified system • diagnostic and measurement information – test record sheets, system operation data, maintenance records, previously measured parameters, reported faults, fault history, errors, reliability • schedule of tasks – list of tasks to complete considering logical order of fault resolution, to reduce system downtime, complete resolution tasks with efficiency, for example resolving the transformer problem first as this component could trigger the additional faults within the system, sub-systems and components. Resolution: • resolution methods – replacing the transformer insulation or full unit, replacing or repairing faulty components and circuit boards (filter capacitor, shorted diode), replacing and reconnecting wires to remove short circuit to diode, identifying a suitable voltage regulator replacement to provide the correct output voltage • processes - ○ interpreting data and manufacturers specifications				

	○ recording – annotate method statement with updates from work carried out, components replaced and actions taken, repairs made ○ standards – WEEE, IET, IEEE • quality of repairs – soldered joints are secure and correctly formed/shaped, polarised components connected the correct way around and clearly marked, screw connections are tightened, correctly matched crimps and wires, no exposed wiring or connections, insulated and correctly colour coded wiring, components calibrated to manufacturers specifications as required • calibration values within operational specification to ensure system accuracy.				
Marks per band	**1-3**	**4-6**	**7-9**	**9**	**15**
Working with faults – detection and diagnosis	**Limited** fault detection and diagnostic techniques carried out demonstrating **basic** knowledge and application of fault finding.	**Good** fault detection and diagnostic techniques carried out with **some success**, demonstrating **good** understanding and application of fault finding with **minor** inaccuracies.	**Thorough** fault detection and diagnostic techniques carried out **systematically and logically**, demonstrating **comprehensive** understanding and application fault finding.		
	One or two faults correctly diagnosed using **at least one** appropriate fault detection and diagnostic technique, performed with **some** accuracy.	**Three** faults correctly diagnosed using **some** appropriate fault detection and diagnostic techniques, performed **mostly** accurately.	**All** four faults correctly diagnosed using a **range** of fully appropriate fault detection and diagnostic techniques, performed **fully** accurately and **with precision**.		
	Some diagnostic and measurement information used to determine the causes of the faults and create a **limited** schedule of tasks for reactive and preventative maintenance activities.	**Most** diagnostic and measurement information used to determine the causes of the faults and create a **clear** schedule of tasks for reactive and preventative maintenance activities.	**All** diagnostic and measurement information used to determine the causes of the faults and create a **comprehensive** and logical schedule of tasks for reactive and preventative maintenance activities.		

Marks per band	1-2	3-4	5-6	6	
Working with faults - Resolution	Resolution methods identified but **may not be fully effective**, with **minimal** reference to manufacturer's specifications and **brief** consideration of recording procedures.	Resolution methods identified from diagnostic and measurement information are **effective** with **some** reference to manufacturer's specifications, **following** recording procedures.	**Effective and efficient** resolution methods selected from diagnostic and measurement information with **thorough** reference to manufacturer's specifications, **comprehensively** recording throughout rectification.		
	One or two faults repaired to an **acceptable** standard, with **limited** consideration of timeframes or standards, and following processes.	**Three** faults repaired to a **good** standard, with **clear** consideration of timeframes and standards, and following processes.	**All four** faults repaired to a **high** standard, with **full** consideration of timeframes and standards, and following processes.		
	Calibration of machine components completed, but **not working within specified tolerances**.	Calibration of machine components completed and working **mostly** within specified tolerances.	Calibration of machine components completed and working **fully** within specified tolerances.		

Assessment theme – Reviewing and reporting

Guidance for assessors
Evidence from Tasks 2, 3a, 3b and 4 should be used to assess performance against this assessment theme.

Task 2
- completed test record sheets
- updated maintenance records and control documents
- annotated method statement, including any recommendations for further investigation if required
- assessor observation of system functionality demonstration.

Task 3a
- technical report
- revised maintenance schedule, including justifications.

Task 3b
- maintenance schedule amended from peer review feedback, including justifications
- completed peer review forms.

Task 4
- handover documentation
- assessor observations of the handover meeting
- video evidence showing the handover meeting with the client.

Note: where there is insufficient evidence to award a mark, a zero mark must be given	**Band 1 descriptor**	**Band 2 descriptor**	**Band 3 descriptor**	**Total marks per sub assessment themes.**	**Total marks for assessment theme**
	Indicative document: Reviewing: • updated maintenance schedule from peer review feedback with adaptions/modifications and improvements with justifications. Reports: • technical report to cover:				

	○ review of the maintenance activities, including cost effectiveness and time management ○ evaluation of fault detection and diagnosis methods effectiveness and suggestions for future improvements ○ fault resolution effectiveness and how to improve in future ○ any outstanding faults, including recommendations that may require attention before the next planned maintenance activity ○ waste disposal methods followed – hazardous waste, recycling, electrical, general ○ reporting to manage stock levels, materials or resources • technical documentation to update and amend - calibration records, records of measured electrical parameters, maintenance records, maintenance schedules and system representations (schematics, block diagram, wiring diagram) • control documents – stock levels, materials, resources, version control, workplace safety logs • amendments – digital/physical, component changes, component labelling and abbreviations, symbols, wiring layouts, PCB/circuit board layouts as appropriate. Handover: • procedures: ○ de-brief - modifications, faults, further investigation, suggested updates and improvements to maintenance schedules including justifications for not making suggested changes, confirmation of work completed, due date of next maintenance activity ○ signatures and date • documentation to handover - test and calibration results, maintenance schedules, updated drawings and diagrams, maintenance records • communication methods – written, verbal, media • demonstration of system functionality – system powers up, each sub-system block outputs the correct values and functions as specified without errors, input and output voltage readings match expected results, description overall electrical and electronic system operation, system powers off.				
Marks per band	**1-2**	**3-4**	**5-6**	**6**	**21**
Reviewing	Changes or to maintenance processes procedures as a result of feedback are **not always suitable** and **lack reasoning,** including a date for next planned maintenance activity which **may not be fully appropriate**.	Changes to maintenance processes procedures as a result of feedback are **suitable with some reasoning**, including an **appropriate** date provided for **next** planned maintenance activity.	Changes to maintenance processes procedures as a result of feedback are **suitable with detailed reasoning**, including an **appropriate** date provided for **next and future** planned maintenance activities.		

	Where no improvements/ adaptions are made to maintenance processes and procedures, this is supported with **brief** reasoning and justifications to why.	Where no improvements/ adaptions are made to maintenance processes and procedures, this is supported with **good** reasoning and justifications to why.	Where no improvements/ adaptions are made to maintenance processes and procedures, this is supported with detailed and **thorough** reasoning and justifications to why.		
Marks per band	**1-3**	**4-6**	**7-9**	**9**	
Reports	**Follow, but not complete**, reporting procedures to manage stock levels, materials or resources, with **some** consideration for accuracy.	**Follow and complete reporting** procedures to manage stock levels, materials and resources, with **clear** consideration for accuracy.	**Follow and complete detailed** reporting procedures to manage stock levels, materials and resources, with **full** consideration for accuracy.		
	Basic technical reporting and evaluation of the maintenance completed, techniques and methods used, with **some basic** technical terms, which **may not be fully accurate**.	**Clear** technical reporting and evaluation of the maintenance completed, techniques and methods used, with **some accurate** industry standard technical terms.	**Detailed** technical reporting and evaluation of the maintenance completed, techniques and methods used, using **fully accurate** industry standard technical terms.		
	Amendments to technical documentation made but **may not be technically accurate or appropriate**, with **some** reference to quality and assurance monitoring processes.	**Mostly** appropriate amendments to technical documentation made with **some technical accuracy** and reference to quality and assurance monitoring processes.	**Fully** appropriate and **technically accurate** amendments to technical documentation made with **clear** reference to quality and assurance monitoring processes.		
Marks per band	**1-2**	**3-4**	**5-6**	**6**	**21**
Handover	**Limited** application of handover procedures using terminology **partially appropriate** for the audience.	**Some** application of handover procedures using **mostly appropriate** terminology to the audience.	**Complete** application of handover procedures, using correct terminology, **fully appropriate** for audience.		

	Some relevant documentation shared as part of handover procedure with **limited explanation**, using **appropriate communication methods but may not be fully effective**.	**Most** relevant documentation shared as part of handover procedure with **some explanation**, **using a range of appropriate** communication methods.	**All** relevant documentation shared as part of handover procedure with **detailed explanation**, using **a range of relevant and effective** communication methods.		
	Brief operational demonstration of system functionality with **some** verbal description of work completed, which **may not be communicated accurately**.	**Sufficient** operational demonstration of system functionality with **clear** verbal description and explanation of work completed, **mostly communicated accurately**.	**Thorough** operational demonstration of system functionality with **detailed** verbal description and explanation of work completed, **communicated accurately**.		

5. Links to maths, English and digital skills

The table below indicates where each of the general maths, English and digital competencies have been integrated into the assignment tasks.

Task	Skills
1	EC1, EC2, EC3, EC4, EC5, EC6, MC2, MC3, MC4, MC5, MC6, MC7, MC8, MC9, MC10, DC1, DC2, DC4, DC5
2	EC5, EC6, MC1, MC2, MC3, MC4, MC5, MC6, MC7, DC1, DC4, DC6.
3	EC1, EC2, EC3, EC4, EC5, EC6, MC2, MC5, MC7, MC8, MC10, DC1, DC2, DC3, DC4, DC5, DC6
4	EC1, EC2, EC3, EC4, EC5, EC6, MC10, DC1, DC2, DC3, DC4, DC5.

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