HM Government

T-LEVELS

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

Employer-Set Project (8730-033)

Candidate Pack

(Sample)

December 2025 Version 2.1

City & Guilds

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Version and date	Change detail	Section
1.0 September 2022	Published version.	Full document
2.0 September 2025	Candidate guidance, Brief and Tasks amalgamated into one document. 'Assessment Objectives and Core Skills' section removed.	Full document Employer Set Project Introduction
2.1 December 2025	Error correction	Employer Set Project Introduction

Employer-Set Project introduction

The Employer-Set Project (ESP) is an assessment, made up of a number of tasks, which will assess the knowledge and skills you have learnt as part of the 'Core' element of your T Level.

Each project is developed together with employers in the industry to reflect realistic types of developments, activities and challenges.

All the tasks relate to the same ESP brief in the following order:

Task		What will you be doing?	Timings	Marks
1	Research	You will conduct research in relation to the project brief.	3 hours	15
2	Report	Using the results of your research from task 1 and the knowledge and skills you have been taught, you will draft a design to meet the requirements of the brief.	4 hours	24
3	Plan	Using the details within the project brief, you will produce a planning chart and supporting statement.	3 hours	18
4	Present	You will present the outcomes of tasks 1, 2 and 3 to your tutor, as if they were a client.	2.5 hours	24
		Totals	12.5 hours	81
			Maths, English and digital skills	9
			Total marks	90

Maths, English and digital skills
Throughout the completion of the tasks within the project, you will generate evidence towards your maths, English and digital skills. There are 9 marks allocated to maths, English and digital skills across all tasks like this:

Maths	3 marks available
English	3 marks available
Digital	3 marks available

General guidance for candidates

As all the tasks relate to the project brief, it is important that you read it carefully and fully **before you start the project**. You will be given 30 minutes' reading time for this purpose at the start of the project.

The ESP is a formal assessment that you will be marked and graded on. You will be marked on the quality and accuracy of the written work you produce. It is therefore important that you carry out your work to the highest standard you can. How well you know and understand the subject, and how you have used your knowledge to complete the project must be clear to the marker. This means you should explain your thinking and how and why you have made your decisions within your written work e.g. as part of your planning, reflections, or evaluations.

Plagiarism

Plagiarism is the failure to acknowledge sources properly and/or the submission of work that is not your own. Plagiarism is **not** allowed in this project.

This project is an assessment of your abilities, so the work submitted **must** be all your own and carried out under the conditions stated. You will be asked to sign a declaration that you have not had any help with the project. Your tutor is allowed to give you some help understanding the instructions, if necessary, but they will record any other guidance you need, and this will be taken into account during marking.

Where research is allowed, your tutor **must** be able to identify which work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge sources used and clearly reference any information taken from them (e.g. providing as a minimum a list of web addresses/books/articles etc. used).

Use of Artificial Intelligence (AI)

AI may only be used as a source where the use of the internet is allowed for a research task. Where you use AI, you **must** acknowledge its use and show clearly how you have used it. Please be aware that how you have decided to use it may impact on the overall mark you are allocated.

Guidance and feedback

There are some rules around how much guidance and feedback your tutor can provide as part of completing the project. Your tutor is allowed to give you some help in understanding the task instructions if necessary. However, if your tutor has to provide significant clarification and guidance, this will be recorded and considered as part of the marking process and may reduce your mark. Your tutor will make it clear if any guidance given may reduce your mark before it is given, so that you understand this when asking for guidance.

Timings and planning

Each task has an allocated duration – you will have to plan your work so you can complete the task within the time allowed. You should take care to make sure you have divided the time available between parts of the task appropriately. If you are not sure how much time you have, check and clarify this with your tutor.

When working under supervised conditions for longer sessions, your tutor will advise you on how breaks can be facilitated.

At the end of the project, before submitting your work, you will be required to sign a 'Declaration of authenticity'. This document confirms the work submitted work is your own and

that the project tasks were completed within the set assessment times. The 'Declaration of authenticity' will also be signed by your tutor.

Presentation of work

Presentation of work must be neat, legible and appropriate to the task. You should make sure that each piece of evidence, including any forms, are clearly labelled with your name. Where there is a template to use this will be provided by your tutor.

All electronic files must be given a clear file name that allows your tutor to identify it as your work. You should consider using a consistent, clear file-naming convention across all the pieces of evidence you generate for submission.

Written work may be word processed or handwritten, unless stated otherwise. Any sketches should be neat and tidy, and annotated appropriately. Any technical drawings should be neat and tidy, drawn to an appropriate scale and annotated appropriately.

Any calculations should be set out clearly, with all working shown, and any assumptions made. You should use appropriate units of measurement at all times. Answers must be expressed to a degree of accuracy, consistent with the requirements of the project.

Word counts

Typical word counts or numbers of pages of evidence are provided within the requirements of each task. Where word counts have been provided, these are given as an indicative guide only to support you to understand the type of response that is expected from you. You will not be penalised as part of the marking if your response is below or above the indicative word count provided, however you should consider the clarity and succinctness of your response if it goes above the word count.

Submission of evidence

Your work will be submitted as final at the end of each assessment session. You will **not** have an opportunity to rework any of your evidence once the assessment session ends. However, if through other tasks within the project, you develop your ideas or build on earlier tasks, then you should continue to build on these and should use your evaluation to outline the reasons why this happened.

Brief

The employer

Generator One Limited are a local company who provide short term solutions to customer's complex power and temperature control issues. They design and install engineering systems such as an Uninterruptible Power Supply (UPS) that provides temporary, cost effective, efficient solutions, that are flexible to meet the customers changing demands.

Generator One Limited ensures the optimum solution is implemented, across a range of applications offered to clients. These include:

- planned electrical and mechanical shutdowns
- unplanned shutdowns and emergencies
- onsite equipment replacement
- supplementary power, heating, or cooling.

The project

Generator One Limited has been approached by a client, the local NHS Trust, who requires their existing hospital backup power systems and standby power system to be replace with a UPS.

The existing back up power system is in the hospital grounds, in an outside caged storage facility, located near the main entrance. The new system will need to be installed into this area.

You have been asked to propose the installation of a standby/offline Diesel Rotary Uninterruptible Power Supply system (DRUPS) (refer to Diagram 1), where the load is powered directly by the input power and backup power circuitry is only invoked when the utility power fails - combining the functionality of a battery-powered or flywheel-powered UPS and a diesel generator.

The ideal of this new system is that a DRUPS will have enough fuel to power the load for days or even weeks in the event of failure of the mains electricity supply.

The commissioning of the end-product will be conducted by a third party.

The client has requested identification of strategies for implementing preventative maintenance systems and routine maintenance programmes as part of the replacement system offering a more reliable and robust solution.

The client has requested identification of requirements for bespoke manufacturing constraints to accommodate a replacement system and is interested in the environmental impact.

The client has provided specification requirements including output voltage, engine data, fuel consumption, lubrication and cooling and generator size.

Working as part of the Generator One Limited team, you need to propose the system that will enable the hospital to continue to deliver the best support and care from the doctors and nurses to all patients.

Product design specification

Introduction

The requirement is to design a system which will be presented to the customer for consideration.

The following information should be noted:

- main switchboards already installed
- main distribution boards already installed
- Power Distribution Unit (PDU) already installed.

Specification and technology requirements

System element	Requirement
Generator Specification	Ratings 400 V - 50 Hz Standby 165 kVA 132 kWe Power factor (Cos Phi) 0,80 Emergency Standby Power (ESP): Average load factor per 24 hours of operation is <85% efficiency Prime Power (PRP) . Average load factor per 24 hours of operation is <75% efficiency Voltage (V) 400/230, 3 phase Type of Cooling: Mechanical driven fan, electrical driven from the generator
Dimensions of the DRUPS	Length (mm) 2370 Width (mm) 1114 Height (mm) 1470 Tank capacity (L) 340 Dry weight (kg) 1578
Engine	Cylinders configuration: L Number of cylinders: 6 Compression ratio: 17 : 1 Speed (RPM): 1500 minimum Maximum stand-by power at rated RPM (kW): 153 Charge Air coolant: Air/Air
Alternator	Number of poles: 4 Number of bearings: Single Bearing
Control Unit	Generator control module

System element	Requirement
Outside caged storage facility	To access the storage facility for the DRUPS • the caged roof top must be unbolted and removed using suitable lifting machinery or equipment • the roof must be placed in a secured location once removed • the caged double doors must be unlocked and open fully so access can be given from the front. The dimensions of the outside storage facility are no more than • Length (mm) 3500 • Width (mm) 2000 • Height (mm) 1600. The caged facility is protected by a secured combination lock that only estates have access to and must be present on site.
Installation of equipment in hospital grounds	To unload electrical generating sets from their transport supports with optimum safety and efficiency, you must ensure that the following points are observed: • the lifting machinery or equipment is suitable and correctly rated for the work required • the sling is correctly positioned in the central lifting eye or the lifting arms are correctly positioned in the fork-lift pockets intended for this purpose • the ground is able to bear the load of the generating set and its lifting machinery without stress (otherwise lay down stabilising beams of sufficient strength). • the generating set is put down as close as possible to its place of use or transport, in a clear space with free access.

System element	Requirement
Installation checks	• Check that the general recommendations from section "Installation" (ventilation, exhaust, connections, etc.) are followed. • Carry out level checks (oil, grease, coolant, diesel, battery). • Carry out free rotational checks of shaft/bearing systems. • Carry out seal system checks. • Ensure that the generating set is correctly earthed (earthing rod). • Ensure that the electrical connections have been made properly. • Ensure that the mechanical connections have been torqued correctly. • Ensure locking features are securely fastened. • Ensure safety covers/guards are securely fastened. • Ensure that the fuel connection has been made properly (valve position), if the generating set is equipped with the three-way valve option enabling external supply.
Checks after starting the generating set	• Carry out the mechanical checks (oil pressure, water temperature, absence of excessive noise, vibration etc.). • Carry out the electrical checks (voltage, current, frequency, rotary field, etc.). • Carry out bearing temperature and unit vibration checks. • Carry out the safety checks (emergency shutdown, oil pressure, coolant temperature, etc.). • Carry out the check on Normal/Emergency Inverter switching or coupling (if fitted).

System element	Requirement
Pre-Start Inspection (engine)	• Inspecting the engine compartment. • Inspect the engine carefully. • Wipe all the grease fittings and caps before carrying out any maintenance to reduce the risk of contaminating the circuits. • Checking the engine oil level - Top up the oil as required. Use an oil whose viscosity is suited to the environmental and operational conditions.

Budget
The NHS Trust have budgeted for one completed project setup including installation to be £38K.

Timescale
Duration of installation, calibration and commissioning/testing of the system amendments and new technology will depend on responses to the project – installation time in excess of ten days will have a significant impact on switch over from existing generator back up to new DRUPS.
Installation can take place within the working day, or at night provided prior arrangement is made and does not affect the hospital operation or disruption to the service.

Plant site considerations
The site can be accessed for installation within the working day, or at night provided prior arrangement is made and that traffic diversions are put into place.
There is good accessibility to the site for delivery of equipment and components, and the DRUPS and associated systems are located in an accessible area of the site itself, where access can be requested through the estate managers.

Additional information

Diagram 1: A Typical Layout of a DRUPS

(Source of image: **Diesel Rotary UPS (DRUPS) - SPG (standbypowergeneration.co.uk)**)

Part Number	Part Name	Part Number	Part Name
1	Electro-magnetic Clutch	6	Vibration dampers
2	Diesel Engine	7	Assembly block
3	Touch Screen Panel	8	Accumulator
4	Power Panel	9	Brushless Exciter
5	Alternator		

Table 1: DRUPS diagram key table

(Source of image: **Diesel Rotary UPS (DRUPS) - SPG (standbypowergeneration.co.uk)**

Task 1 Research

You have been asked to help respond to the project that the NHS Trust has allocated. You need to research different types of DRUPS manufacturers in line with the specifications provided by the client.

With reference to the project brief, you are to conduct research into **two** different types of DRUPS to determine:

- estimated cost of installations
- estimated cost of DRUPS systems
- laws and regulations that apply to the installation and maintenance of DRUPS on site
- tolerances, set points, operating parameters and calibration requirements once installation has been completed
- risk assessments to be adhered to whilst installing equipment.

When conducting your research consider:

- client requirements relating to the DRUPS being used as a backup power system with regards to content
- environmental and noise factors when considering the installation and ongoing use of the equipment
- health and safety regulations that impact on the system design, installation and testing
- risk assessments.

You must collate the findings from your research of the two different types of DRUPS with the client's design specification into a technical brief capturing all requirements for a DRUPS.

The technical brief will typically be 1500 words (not including references). The document can include sourced pictures, engineering drawings, schematics, images, specifications, and CAD diagrams and sketches.
You must also provide any notes and calculations made as part of your research, including details of your research approach and how you planned your research.

Timing of assessment

- You will have **three hours** to carry out the research and complete the technical brief.

Conditions of assessment

- Your technical brief should be completed working alone under supervised conditions.
- You must not share or discuss your work with other candidates.
- You will have access to the Internet to conduct your research.
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.

What you must submit on completion of this task

- Technical brief (typically 1500 words) hard copy or file saved securely (e.g. in a secure online location or on memory stick to be handed in).
- List of references/sources.
- Research notes.

Additional evidence of your performance that will be captured for marking

- N/A

Marks available

- 15

Task 2 – Report

Following the completion of the investigation into different DRUPS and requirements, the NHS Trust has reviewed the suggestions made. To progress with the response to the tender you now need to help identify the equipment and technology to be used within your preferred DRUPS installation (i.e. **one** of the two you have previously researched).

You have been asked to draft a report, detailing appropriate components to be selected and used, along with installation drawings of your preferred DRUPS on site.

The report should clearly cover the following points:

- installation requirements including the access to site and installing the system safely without inconvenience to the hospital including risk assessments
- advantages and limitations of system selected
- technical and commercial justification for selected equipment
- health and safety regulations
- how your preferred DRUPS meets the brief requirements
- how your preferred DRUPS enables preventative maintenance systems and routine maintenance programmes.

Along with the written report your annotated drawings must detail:

- location of parts
- electrical and mechanical connections of components and equipment
- system layout.

The written report will typically be 2000 words.
The drawings will typically be **one** side of A3.

Timing of assessment

- You will have **four hours** to complete your report and installation drawings.

Conditions of assessment

- Your report and drawings should be completed working alone under supervised conditions.
- You must not share or discuss your work with other candidates.
- You will have access to a copy of your response to the previous task (for review purposes only).
- You will **not** have access to the Internet for the completion of this task.
- Your drawings must be completed manually (not using CAD software).
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.

What you must submit on completion of this task

- Written report (typically 2000 words) – hard copy or file saved securely (e.g. in a secure online location or on memory stick to be handed in).
- Drawings (typically one side of A3).

Additional evidence of your performance that will be captured for marking

- N/A

Marks available

- 24

Task 3 – Plan

You have been asked to contribute to an overall project plan. The project plan is to include the order of work processes to be completed as part of the installation of the DRUPS. You will need to consider in which order the relevant equipment is to be ordered, checked and installed.

Create a planning chart of work including the following considerations:

- purchasing of the equipment
- the order of installation and setting up of components
- the main equipment and tools required for the installation
- commissioning/testing and calibrations on site and off site
- duration and sequence of the project including a critical path
- who will be involved with each process and resources required.

Planning charts can be presented in an industry recognised format of your choice. You may choose to complete your planning chart using digital software, but you do not have to do so.

Provide a supporting statement to justify your planning chart taking into consideration:

- job roles and responsibilities
- health and safety considerations
- specialist tools, equipment and resources – hire and source
- cost considerations and implications.

The planning chart will typically be **one** side of A4.
The supporting statement will typically be 1000 words.

Timing of assessment

- You will have **three hours** to complete your planning chart and supporting statement.

Conditions of assessment

- Your planning chart and supporting statement should be completed working alone under supervised conditions.
- You must not share or discuss your work with other candidates.
- You will have access to software that may be required to create the planning chart (e.g. word processing software, spreadsheets etc.).
- You will have access to copies of your responses to the previous tasks (for review purposes only).
- You will **not** have access to the Internet for the completion of this task.
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.

What you must submit on completion of this task

- Planning chart (typically one side of A4).
- Supporting statement (typically 1000 words) – copy of file saved securely (e.g. in a secure online location or on memory stick to be handed in).

Additional evidence of your performance that will be captured for marking

- N/A

Marks available

- 18

Task 4 – Present

The installation of the DRUPS at the hospital has now been approved and you are required to report on the process of installation and commissioning the equipment into the correct location within the Trust.

You are to prepare and deliver a presentation which will be shown to the NHS Trust as part of an upcoming meeting - the attendees will have a non-technical engineering background.

You must use digital technology for the presentation.

You must cover:

- technology, and equipment you have selected and justified
- how the DRUPS equipment functions to meet the client requirements
- system commissioning, health and safety considerations for testing and calibration considerations including scheduled maintenance plans and action plan for unplanned breakdowns
- budget estimate costs for design, production and installation
- challenges presented by the brief and how these have been overcome
- how well your proposal addresses the requirements of the brief.

Your assessor will take on the role of a manager from the NHS Trust. They will ask questions relating to your presentation from a client's perspective.

Timing of assessment

- You will have **two hours** to prepare your presentation.
- You will have **30 minutes** to present your findings and respond to questions (typically split with 20 minutes for presenting your findings and ten minutes for responding to questions).

Conditions of assessment

- Your presentation should be developed and delivered working alone under supervised conditions.
- You must not share or discuss your work with other candidates.
- You will have access to copies of your responses to the previous tasks (for review purposes only) as well as any presentation materials/notes (e.g. PowerPoint slides).
- You will have access to digital technology for the presentation of your findings - you can choose the format/program and program features you wish to use (e.g. PowerPoint).
- You will **not** have access to the Internet for the completion of this task.
- Assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed.

What you must submit on completion of this task

- Presentation materials – e.g. slides, handouts etc. hard copy or digital file saved securely (e.g. in a secure online location or on memory stick to be handed in).

Additional evidence of your performance that will be captured for marking

- Video recording of presentation.

Marks available

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