City & Guilds

A City & Guilds Group Business

1145-30 Level 3 Advanced Technical Certificate in Engineering

2024

Qualification Report

Contents

Introduction

This document has been prepared by the Chief Examiner and Principal Moderator; it is designed to be used as a feedback tool for centres in order to enhance teaching and preparation for this assessment. It is advised that this document is referred to when planning delivery and when preparing candidates for City & Guilds Technical assessments.

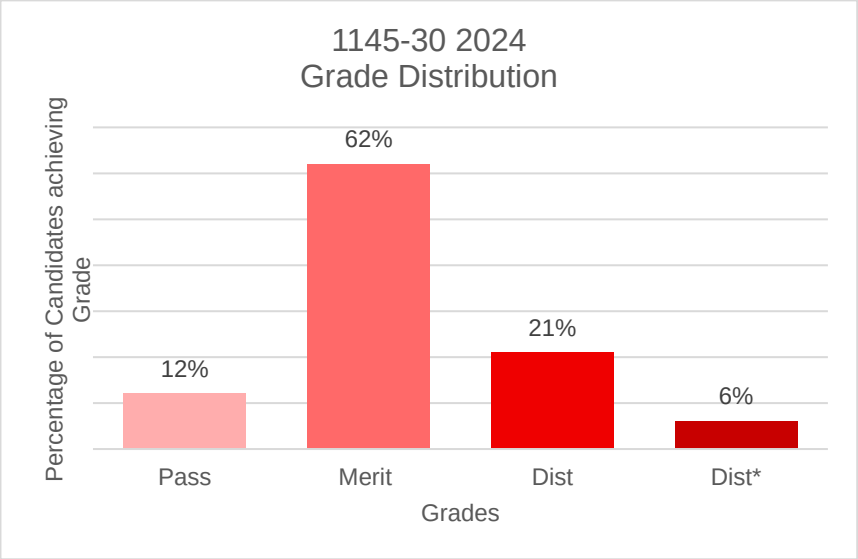
This report provides general commentary on candidate performance in both the synoptic assignment and theory exam. It highlights common themes in relation to the technical aspects explored within the assessment, giving areas of strengths and weakness demonstrated by the cohort of candidates who sat assessments in the 2024 academic year. It will explain aspects which caused difficulty and potentially why the difficulties arose.

The document provides commentary on the following assessments:

- 1145-530 Level 3 Engineering - Theory exam (1)
  - March 2024 (Spring)
  - June 2024 (Summer)
- 1145-031 Level 3 Engineering - Synoptic assignment (1)

Qualification Grade Distribution

The approximate grade distribution for this qualification is shown below:



This data is based on the distribution as of 19th August 2024.

Please note City & Guilds will only report qualification grades for candidates who have achieved all of the required assessment components, including Employer Involvement, optional units and any other centre assessed components as indicated within the Qualification Handbook. The grade distribution shown above could include performance from previous years.

Theory Exam

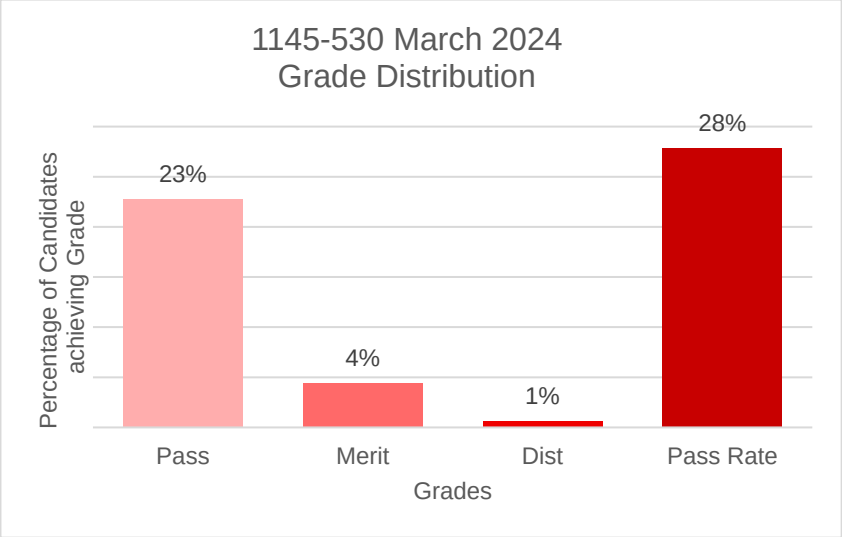
Grade Boundaries

Assessment: **1145-530 Level 3 Engineering – Theory exam**
Series: **March 2024**

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:

Total marks available	100
Pass mark	39
Merit mark	54
Distinction mark	69

The graph below shows the approximate distributions of grades and pass rate for this assessment:

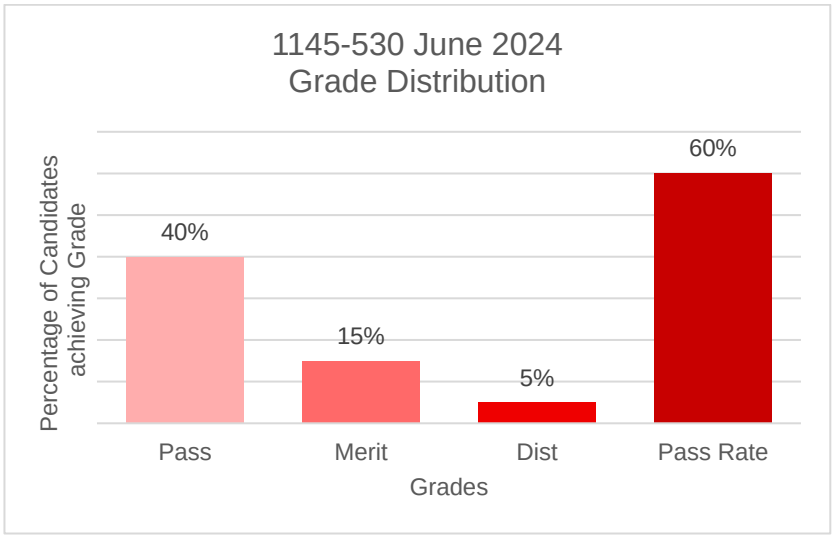


Assessment: **1145-530 Level 3 Engineering – Theory exam**
Series: **June 2024**

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:

Total marks available	**100**
Pass mark	40
Merit mark	54
Distinction mark	69

The graph below shows the approximate distributions of grades and pass rate for this assessment:



Chief Examiner Commentary

Assessment component: 1145-530 Level 3 Engineering – Theory exam

Series 1 – March 2024

The paper as a whole met the requirements of the specification, were of a similar level to the previous papers and covered a good range of topics in the specification. There was a generally poor response to this paper by candidates. In particular, candidates did not appear to have knowledge of some topics within the specification and where questions asked for explanations, candidates frequently responded with statements and did not show their depth of understanding.

When focusing on Engineering Materials (Unit 301), candidates displayed a good understanding of material properties, such as brittleness and toughness, particularly regarding quenching and tempering processes. Some candidates excelled in defining and explaining mechanical properties, although this was not consistent across all. It was noted that there was a significant gap in the ability to recall and define basic concepts like fusibility and specific heat capacity, which suggests a need for stronger foundational knowledge. The application of knowledge to explain processes, such as why tempering improves toughness, was lacking, indicating a need for more depth in understanding material science principles. Questions relating to composite materials and superconductors were particularly poorly answered, with candidates often resorting to general knowledge rather than specific details required by the questions.

When looking at Manufacturing Methods in Engineering (Unit 304), some candidates were able to correctly describe and discuss the advantages and disadvantages of different manufacturing processes, such as JIT (Just-In-Time) production. A weakness in practical application questions was noted, such as those involving CNC machines and go-no-go gauges. These were poorly answered, suggesting a lack of practical exposure or understanding.

In regard to Engineering Design (Unit 305), some aspects of design needs were understood well by a portion of the cohort. It was noted that candidates struggled with understanding and correctly using specific design tools such as comparison matrices. Particularly question 8 was generally answered poorly with repetitive answers demonstrating a weaker area of knowledge surrounding the activities involved throughout product design.

With reference to Engineering Mathematics and Statistics (Unit 306), calculation of safety factors and interpretation of data from electrical outputs were done correctly by a good proportion of candidates, suggesting strong numerical and analytical skills in these areas. However, there was a significant issue with candidates using exact values for estimations, which shows a misunderstanding of the concept of estimation. A high proportion of candidates did not attempt some of the more complex calculation questions, possibly indicating a lack of knowledge in tackling challenging problems. Differentiation was particularly weak and, thus, showed a considerable lack of knowledge on this crucial area of the specification.

Responses to extended response questions (ERQs) were generally well answered when it came to discussing social and economic implications, demonstrating the cohort's ability to engage with complex, multifaceted issues. However, there was a noted inconsistency in the depth and quality of responses, suggesting variability in preparation and understanding among the candidates.

The paper met the requirements of the specification, were of a similar demand to the previous series and covered a good range of topics in the specification. There was generally moderate response to this paper by candidates. The candidates did tackle the questions on generic topics well relying on common sense and general knowledge. For other topics, most responses lacked depth of understanding and knowledge. Overall, this was a re-sit series, with these candidates displaying moderately good performance shown by an increased average mark for this examination.

Candidates demonstrated a satisfactory level of understanding across the range of topics in the June series exam. Many displayed solid knowledge recall and understanding across units 301, 304, 305, and 306 of the specification. However, it was evident during the marking process that candidates did not necessarily read the questions correctly or in-depth enough before starting their answers. This was particularly apparent in the question on design process. It may be necessary to provide candidates with guidance on how best to interpret the questions and consider their answers before responding. This could be implemented at the provider/centre level. Some of this group of candidates made handwritten notes, and diagrams, in the spaces around the questions, and this appeared to help them, as proved evident in the quality of their answers.

Candidates demonstrated proficiency in several key areas. Topics related to Health & Safety in the workplace were largely tackled effectively, showcasing a solid understanding of fundamental concepts and their practical applications. The cohort also engaged well with questions on engineering processes, reflecting a strong emphasis on practical knowledge and awareness of the practical aspects of engineering and manufacturing. There was a reasonable understanding of the annealing process, although some confusion with hardening processes was noted. Better candidates excelled in defining and explaining mechanical properties, highlighting a deeper grasp of these topics. The forging process was another area of strength, with some candidates accurately describing how heat and plastic deformation are used together to alter the shape and properties of materials. In terms of design needs, a significant portion of the cohort demonstrated a good understanding, particularly in the extended response question (ERQ) related to social and economic implications, which indicated strong analytical thinking.

Candidates exhibited several notable weaknesses. There was a significant lack of knowledge in testing methods for materials and an understanding of corrosion resistance, indicating a need for stronger foundational knowledge. The application of material science principles, such as explaining the annealing process, was also lacking, suggesting a need for more depth in understanding. Questions related to composite materials and the use of an autoclave were particularly poorly answered, with candidates often relying on general knowledge rather than the specific details required. Responses to the casting process were inconsistent, as many candidates did not recall that a mould is necessary and that it needs to be topped up with molten metal. In design for manufacture, candidates struggled to understand how processes and material selection are interconnected. The virtual modelling question was another area of weakness, with many candidates failing to recall that a model or prototype is needed, and that testing can be conducted during the process. Additionally, there were significant issues with understanding and manipulating complex numbers, and a high proportion of candidates did not attempt the differentiation question using the product rule, highlighting a lack of exposure to this crucial area of the curriculum. Graph analysis and manipulation of quadratics were also particularly weak across the group.

The ERQs were generally well-answered when it came to discussing social and economic implications, demonstrating the cohort's ability to engage with complex, multifaceted issues. However, there was a noted inconsistency in the depth and quality of responses, which suggests variability in preparation and understanding among the candidates. While some candidates

displayed a strong ability to analyse and synthesize information to construct well-reasoned arguments, others struggled to fully address the complexities of the questions. This inconsistency highlights the need for more uniform preparation and a better grasp of the topics covered in the ERQs.

Centres are reminded of the City & Guilds Technicals 'Exam Guides' available here
Technicals in Engineering qualifications and training courses | City & Guilds (cityandguilds.com)

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Synoptic Assignment

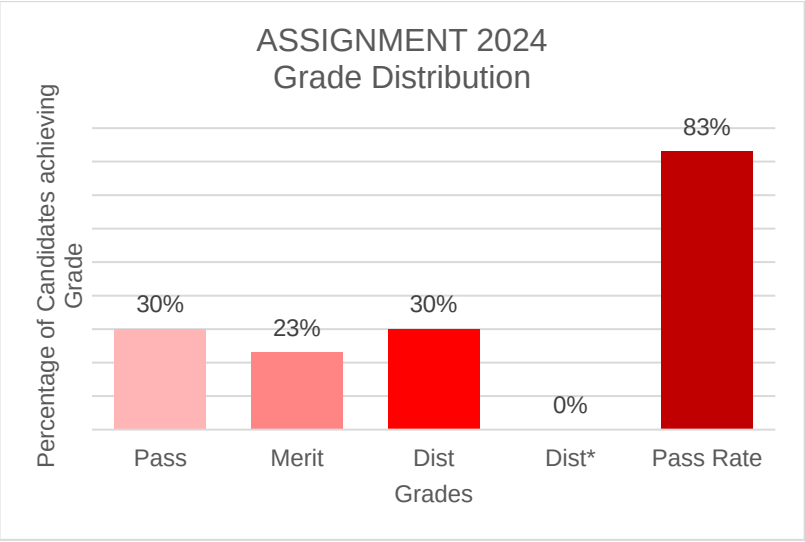
Grade Boundaries

Assessment: 1145-031
Series: 2024

Below identifies the final grade boundaries for this assessment:

Total marks available	60
Pass mark	27
Merit mark	36
Distinction mark	46

The graph below shows the approximate distributions of grades and pass rate for this assessment using the above boundary marks:



Principal Moderator Commentary

Assessment component: 1145-031 Level 3 Engineering – Synoptic assignment (1)

The assignment was similar in demand to the previous series. This view was reinforced by the evidence provided by the candidates, which was sufficient, valid and of appropriate quality to support marking and moderation.

The assignment involved the design and manufacture of automated raising bollards used to prevent unauthorised vehicles from gaining access to roads or parking areas. The bollard lowers when a permitted vehicle approaches and rises after the vehicle has passed it.

This was carried out as a series of structured tasks, specified in the assignment brief. The assessment objectives assessed by this assignment were AO1 (Recall of knowledge), AO2 (understanding), AO3 (practical skills), AO4 (bringing it together) and AO5 (attending to detail / perfecting). In general, most candidates made good attempts at all tasks in the assignment.

For AO1 (recall of knowledge), in general, the design specification, investigation of potential designs, circuit diagrams, and evaluation displayed the use of appropriate technical terms. There were some candidates whose evidence could have been improved by including annotated technical drawings.

For AO2 (understanding), in general, evidence was appropriate. It was the level of explanations and annotations provided during design activities that differentiated candidates. In order to support the design specification, the best available evidence consisted of the reasons for selecting the electronic components and material(s) of the housing, as well as reasons for the selection of the electronic components. By adding more annotations to their microcontroller programs, some candidates could have improved their evidence, indicating that the sequence of activities has been clearly understood.

The AO3 (practical skill) was evidenced appropriately, with relevant commentary on the practical observation form, along with pictures of the manufacturing process in progress and the final product. Pictorial evidence, as well as videos of the actual test, was provided by most of the candidates. Additional 'close-up' images illustrating specific features could have supported this for a small percentage of candidates.

For AO4 (bringing it all together), a number of factors, particularly the ones considered during the creation of design ideas and the evaluation, were well evidenced.

For AO5 (attending to detail), the use of supporting videos by a large proportion of candidates was usually well evidenced. While candidates' evaluations were mostly subjective, the assessors' comments on the practical observation form supported these evaluations.

The markers clearly considered all AOs while awarding marks, which is commendable. It would be helpful for moderation if centres made or added comments that illustrated where assessment criteria were specifically addressed.