OCR
Oxford Cambridge and RSA

CAMBRIDGE NATIONALS

Examiners' report

SYSTEMS CONTROL IN ENGINEERING

J833, J843

R114 (moderated)
R115 (moderated)
R116 (moderated)
Summer 2018 series

Version 1

Contents

Introduction

Our Lead Moderators' reports are produced to offer constructive feedback on centres' assessment of moderated work, based on what has been observed by the moderation team. These reports include a general commentary of accuracy of internal assessment judgements; identify good practice in relation to evidence collation and presentation and comments on the quality of centre assessment decisions against individual Learning Objectives. This report also highlights areas where requirements have been misinterpreted and provides guidance to centre assessors on requirements for accessing higher mark bands. Where appropriate, the report will also signpost to other sources of information that centre assessors will find helpful.

OCR completes moderation of centre-assessed work in order to quality assure the internal assessment judgements made by assessors within a centre. Where OCR cannot confirm the centre's marks, we may adjust them in order to align them to the national standard. Any adjustments to centre marks are detailed on the Moderation Adjustments report, which can be downloaded from Interchange when results are issued. Centres should also refer to their individual centre report provided after moderation has been completed. In combination, these centre-specific documents and this overall report should help to support centres' internal assessment and moderation practice for future series.

General overview

It is important for moderators to receive candidate work from centres by the deadline date. There were isolated cases of work not being received by this date. Moderators will then need to contact centres to enquire when it will be sent. Delayed submission of samples slows down the moderation process, and the resolution of issues should they arise during moderation.

Centres should check carefully what sample work is being requested and ensure that the correct sample of candidates is sent to the moderator.

A completed Unit Recording Sheet (URS) is required for each candidate in the requested sample. If a URS is not included for every candidate, the moderator will contact the centre and request them to be sent. Without a correctly completed URS for each candidate moderation cannot take place and will be delayed.

Clerical errors

Check the addition of marks on the URS and once they are transcribed to Interchange. If they are incorrectly totalled, we will need to reconfirm them with centres at moderation. This introduces delay to the moderation process.

A copy of the IMS1 mark sheet produced by Interchange should be sent along with the sample to your moderator so they can check the sample sent is correct.

Standard of assessment by centres is mostly consistent for this series. Where this is not the case, the assessment tended to be too generous or variable. Detailed reasons for this are highlighted in the separate Report to Centre provided to the centre for that unit. Generic comments for this unit are included in the next section of this report.

Teacher commentary on the URS

Teacher commentary on the URS, along with clear indication of how the mark credited is derived, helps greatly with the moderation process. Page numbers of where evidence can be found in the candidate evidence is also extremely useful. Candidate work can also be directly annotated showing where each learning outcome and mark band is being addressed.

Centres are reminded that work cannot be double counted, and if used as evidence for one leaning outcome should not be used for others. This is also the case for work that overlaps more than one unit within the qualification. Work that is double counted might be discounted if found during moderation, thereby disadvantaging the candidate.

If more than one marker is marking a cohort of work, it is crucial to standardise marking across markers. Internal standardisation ensures that the marks presented are accurate and consistent, and that the rank order of marks is maintained. Rank order errors are referred back to the centre by the moderator and often require the centre to remark work, thereby delaying the moderation process.

Photographic evidence should be annotated by the candidate to explain what is being presented. It should also clearly identify the candidate using their candidate number.

R114 Comments by LO

LO1 – Be able to use CAD for circuit simulation and design

There was clear evidence within this LO of candidates being able to produce a circuit schematic diagram in software, and the circuit being simulated. In some cases, there was limited evidence of simulation, or of any circuit modification through testing. Without this, the higher mark bands cannot be accessed.

The LO also requires candidates to demonstrate how they can use software to produce a PCB layout, which must include both track and component views. Photographs and annotated screenshots are an effectively to illustrate simulation and show PCB layout production. Review of the PCB layout to ensure correct functionality is also a requirement to ensure access to the higher mark bands, and this was sometimes omitted.

LO2 – Be able to construct circuits

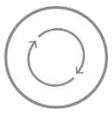
LO2 requires candidates to safely manufacture a blank PCB and to populate the PCB using suitable components. While it was often clear that candidates had done this, their presentations did not clearly show some crucial steps such as health and safety, testing of the blank PCB and the quality of construction. This could be achieved by candidates including further annotated photos (e.g. a photo diary) with commentary, and also by the inclusion of a witness statement or similar. A proforma witness statement is included with the Live (model) Assessment which can be used to corroborate and support candidate evidence.

OCR support

Witness statements:

Please ensure that the witness statement is correctly used to support and corroborate candidate-generated evidence.

If you are unsure, please refer to the OCR CPD Hub website for many free face to face and online training events.



AfL

High Quality in the context of the final part of this LO (mark band 3) refers to being able to produce a fully operational circuit.

Please refer to the Assessment Guidance in Appendix B of the Specification document and read this in conjunction with the Marking Criteria and the Unit Specification to see what is required.

LO3 – Be able to test electronic circuits

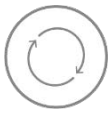
For LO3 there was evidence of testing, but in many cases, this was not actually a set of measurements. Sometimes it was simply a generic photograph of a piece of test equipment (e.g. multimeter) and a statement that testing had been undertaken. This is an inadequate response to access the higher mark bands. There was also evidence of only visual testing being performed.

Again, this LO can be supported with a witness statement. Candidates should provide more detailed evidence to satisfy this LO, such as annotated photos and records of tests and measurements performed. This should include measurements taken against those that are expected (e.g. voltage, current, logic or waveform readings) in addition to visual testing.

R115 Comments by LO

LO1 – Understand how computers are used in engineering design, manufacture and process control

For LO1 candidates are required to demonstrate understanding of how computers are used within engineering design, manufacture and process control. This was often well attempted with examples including computer aided design (CAD), computer aided manufacturing (CAM) and computerised process control. Where candidates did not clearly address all three areas, this limited their access to the higher mark bands.



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Synoptic teaching and learning:

Candidates are required for this LO to draw upon skills/knowledge/understanding from other units in the specification and it would be useful if this was made explicit within their responses.

LO2 – Understand how computers are used for maintenance of engineering systems

For LO2 candidates are required to demonstrate understanding of Human Machine Interface (HMI) and expert systems in maintenance. While these were often well described, candidates did not always access and interpret data from a system and make recommendations for corrective actions. This LO therefore requires that candidates are given access to maintenance data, which centres will be required to source. Examples include engine management system fault codes, machine fault codes and other fault code data. Examples such as interpreting fault codes from a printer are perhaps a little limiting in their scope. Candidate evidence for this LO could be provided in the form of annotated photographs supported by a witness statement.

OCR support

Witness statements:

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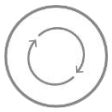
LO3 – Know how computers are used to communicate and use data for production and maintenance

LO3 requires candidates to explain how computers exchange data during manufacturing operations, and how they communicate and exchange data during maintenance operations. In some cases, both forms of communication were not apparent, only one. They are also required to explain how production data is used in maintenance operations, and how hand-held devices are used in both manufacturing and maintenance systems. Candidates need to address all these points to secure access to marks in the higher mark bands.

R116 Comments by LO

LO1 – Understand the application and operation of microcontrollers and microprocessors in engineered products

In LO1 candidates must demonstrate understanding of microprocessor/microcontroller layouts in products or systems. This could be done using a range of examples and include input, output and control devices (e.g. for a washing machine, CNC machine etc.). Operation of the system also requires explaining. This was generally well attempted however elements were sometimes missing. Some candidates also only provided one example, and so should be encourages to provide at least two or three examples.



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Common misconception

A common misconception with this LO is that candidates explain (often with diagrams) the internal architecture of the microprocessor or microcontroller itself. This is not what is required here. The layout should be for the whole system used in a product or system employing one of these programmable devices.

LO2 – Be able to design, develop and simulate a control system solution

In LO2 candidates are required to design, develop and simulate a control system. While this was generally well attempted, forms of evidence were sometimes difficult to follow. Evidence could include flow charts, annotated program code, annotated screen shots showing programming taking place, photographic evidence of hardware implementation etc.. This could be supported using a witness statement. While it was apparent that candidates were able to develop and program a control system, the evidence did not always do this full justice, so limiting access to the higher mark bands.

OCR support

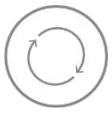
Witness statements:

Please ensure that the witness statement is correctly used to support and corroborate candidate-generated evidence.

If you are unsure, please refer to the OCR CPD Hub website for many free face to face and online training events.

LO3 – Be able to test control systems

For LO3 candidates are to develop a test plan and to test their system against this plan. They are then required to suggest system improvements/refinements based upon outcomes of this testing. This was generally well attempted; however, the evidence provided was sometimes unclear as to how the system had been tested. One way of providing this would a tabulated grid showing a series of tests to be undertaken, expected results and actual results of testing. Again, this LO can be supported by a witness statement if required. To ensure access to the higher marks bands, clear improvements and refinements need to be made.



AfL

Candidates could be provided with a blank tabulated test template to complete for this LO

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