



Course Report 2015

Subject	Engineering Science
Level	National 5

The statistics used in this report have been compiled before the completion of any Post Results Services.

This report provides information on the performance of candidates which it is hoped will be useful to teachers, lecturers and assessors in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published assessment and marking instructions for the examination.

Section 1: Comments on the Assessment

Summary of the Course assessment

Component 1: Question Paper

A total of 91 centres presented candidates this year and 16 of these did so for the first time. It is also pleasing to be able to report that there was an increase of more than 500 candidates sitting National 5.

The analysis of the Question Paper showed that the 2015 exam was fair, balanced and accessible. The full range of marks was awarded in all questions and the assessment was found to function as intended.

A review of candidate performance in the Question Paper found that the level of demand was similar to the 2014 examination, however, the grade boundaries were increased this year by 2 marks at all levels to account for issues with the assessment of the course Assignment.

Component 2: Assignment

A total of 11 centres were verified this session. This was the first year that visiting verification took place for the IACCA. This had many advantages including the opportunity for centres to display video evidence of system simulation and the invaluable opportunity to provide one-to-one feedback to assessors, supporting their understanding of the National Standards.

All centres verified used one of the three SQA assignments provided on the secure site – meaning that the instruments of assessment used were valid. **Centres should be aware that it is mandatory for centres to use one of the assignments from the current SQA bank for the assessment of Component 2.**

To keep the Assignment tasks fresh, the Care Home Assignment has now be removed from the bank and it will, in October 2015, be replaced with an alternative Assignment. Please note that it will not be acceptable to use the Care Home Assignment in diet 2015-16 or any subsequent years.

Of the 11 centres verified, approximately 50% were assessed to National Standards. Of the remaining 50%, most centres were lenient in their marking – some by a large margin. This would indicate that a number of centres still have issues when applying assessment criteria. Centres should be encouraged to use the materials and commentaries available on the Understanding Standards website to support their learning.

Section 2: Comments on candidate performance

Summary of Candidate Performance

Component 1: Question Paper

A total of 1,798 candidates were presented this year and the majority were generally well prepared for the Question Paper.

Calculation based questions were consistently well answered, however, it was noted that missing or incorrect final units were disappointingly common. The descriptive questions produced poorer responses and many candidates either failed to read the question correctly or else provided insufficient detail for the available marks.

Component 2: Assignment

Candidates performed better in the Assignment this session than in year 1 of presentation. This could be as a result of many factors, including the verification experience showing that a number of centres are still marking leniently. To reflect this, the grade boundaries were moved by two marks from nominal.

After the experience of last session, additional clarity was provided to the Band Descriptors. Holistically, assessors should decide on what band a candidates work should sit in, and then decide on a mark within that band. However, the additional clarity also assists assessors by providing information on the weighting applied to specific parts of some sections.

Section 3: Areas in which candidates performed well

Component 1

- Question 2: most candidates correctly calculated the resistance of the lamp.
- Question 4(a): the velocity ratio was correctly calculated by the majority of candidates.
- Question 10(d): candidates made a good attempt at calculating the speed of the turbine but many used *rpm* rather than *revs min⁻¹* for the final unit.
- Question 11(a)&(b): candidates consistently calculated the energy and efficiency of the winch system.
- Question 14(d): the majority of candidates sketched the symbol for an ammeter and identified that it should be wired in series.

Component 2

Where evidence was provided, candidates performed well in the simulation aspects of the Assignment. It should be stressed that:

- As this is a summative assessment, evidence must be provided. Observational evidence is not appropriate. Where no evidence is present, candidates should be awarded 0 marks for that section;

- For evidence of flowchart simulation, any printout should include the microcontroller simulation, with inputs and outputs attached. A flowchart on its own is not appropriate evidence of a simulation having taken place.
- As the model for verification is now one of visiting, centres can now provide video evidence of simulation. If this is the case, video files should be separately named with the name of the candidate.

Section 4: Areas which candidates found demanding

Component 1

- Question 3 (b): candidates had difficulty in stating a function of an output driver.
- Question 5 (a) & (b): many candidates did not correctly describe an advantage to a designer or manufacturer in the use of a microcontroller and instead responded with generic advantages.
- Question 8 (a) to (c): a significant number of candidates did not correctly describe the role of the engineering branch at the design, construction or monitoring phase of the project.
- Question 9 (a): the drawing of the vector diagram was problematic for candidates and many did not use arrows to indicate the direction of the force action.
- Question 10 (c): a number of candidates answered this descriptive question with simple statements such as '*smaller*'.
- Question 13 (b): candidates tended not to properly read the question and stated a structural rather than electronic based aspect to be simulated.
- Question 15 (b): a large number of candidates could not state the continuous loop operation of the control sequence.

Component 2

Candidates continue to find the following areas demanding:

- Analysis** This should include the following aspects: top-level, generic systems diagram, sub-systems diagram (including closed loop control, systems boundary etc.) and full specification. If the specification items are numbered, they can be referred to in the testing and evaluation.
- Test Plan** This should include three main aspects i.e. details of the test to be carried out (including detail of hardware and software required), information on the expected outcome and actual results. Some candidates find that a table is an appropriate way of presenting this information, although it is not the only method. **There should be a minimum of one test for each sub-system identified.**
- Evaluation** This should reflect on the outcomes of each test, comparing it to the expected results and the original specification. It should also include details of any alterations to the system throughout the process and suggestions for further improvement.

Record of Progress A significant number of candidates merely wrote a couple of words like “ok” or “works fine”. These are not National 5 level responses. The Record of Progress is an important reflective record of a candidate’s learning. It also serves as additional evidence for verification purposes. Candidates should detail for each lesson, what they have learned, what they have achieved, any help they have received and what they plan to do next lesson.

Section 5: Advice to centres for preparation of future candidates

Component 1: Question Paper

The descriptive questions were found to be challenging by many candidates. The question contexts were often ignored; responses were basic, not expressed clearly or lacked a logical flow, and the correct terminology was not always used. Reading and communicating are important engineering skills and so centres are encouraged to make use of past paper descriptive questions to help prepare future candidates.

This year saw many candidates round up the final answers and as a result the Marking Instructions were amended to ensure that candidates were not penalised for this. Centres should note that in future examinations, final answers will be expected to be expressed in the same number of significant figures as the least significant data value in the question (this guidance will be repeated on the front of Question Papers and also in our marking instructions). Correct answers, expressed up to two significant figures more or one less, will also be accepted.

Incorrect or missing final units continues to be an issue for candidates. Centres may wish to emphasise the use of the Data Booklet to ensure that common errors seen this year are avoided. For example, *rpm* was often used instead of *revs min⁻¹* and *Pa* was mistakenly used rather than *N mm⁻²* (or *MPa*) when calculating pressure with an area expressed in square millimetres.

There are still a number of candidates who did not include pin numbers in flowchart boxes or use the symbols provided in the Data Booklet. Centres may wish to encourage good practice in this area.

The role of the engineering branches was consistently poorly answered in Question 8 and Question 13 (a) and (b). Centres may wish to take additional steps to ensure that candidates are appropriately prepared.

A small but significant number of candidates used 9.81 as the value for *g* when calculating potential energy. Centres may wish to direct candidates to use the Data Booklet value.

Component 2: Assignment

Centres should be aware that the Assignment is a vehicle to assess candidate’s problem solving skills. They should work through a **process** to apply the knowledge they have learned in the Course to solve a practical engineering problem.

For this reason, candidates should be encouraged to build thoughtful, analytical skills throughout the Course in preparation for the Assignment. Centres should note that the Assignment is open-book in nature. This means that candidates are able to access course notes, practice Assignments and online resources and use them in their own Assignment.

Only limited scaffolding should be provided to support candidates. They should not be provided with templates and should be able to structure the report in any way they choose. Evidence for each band can be found in any part of the report and marks can be assigned accordingly. Even if a class cohort attempts the same Assignment, it would be reasonable to expect very different responses from each candidate. However, where teacher assistance is given, due cognisance of the level of support should be taken into account when marks are being allocated.

It is also crucial to note the level of support provided in the justification of mark allocation for verification purposes.

Statistical information: update on Courses

Number of resulted entries in 2014	1296
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Number of resulted entries in 2015	1808
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Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark - 150				
A	47.3%	47.3%	855	107
B	22.8%	70.1%	413	92
C	15.9%	86.0%	287	77
D	5.8%	91.8%	104	69
No award	8.2%	-	149	-

For this Course, the intention was to set an assessment with grade boundaries at the notional values of 50% for a Grade C and 70% for a Grade A. The question paper was to standard, however it was felt that, as a consequence of the application of the marking instructions of the course assignment, that demand had been eased in this area. As a consequence, grade boundaries were moved by two marks at all levels (as an interim measure until the Course Assignment issues are addressed).