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Principal Learning

Engineering

OCR Level 3 Principal Learning in Engineering **H811**

Report on the Units

June 2009

H811/MS/R/09

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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REPORTS ON THE UNITS

Chief Examiner Report

Introduction

This is the first year of assessment for the Principal Learning units within the Diploma in Engineering and I am pleased to report the process worked well.

The opportunities for presenters to attend INSET, to use the excellent support materials provided and make their views known on delivery and assessment has helped the development of many of the units within the scheme. Learners clearly benefited from the experiences of centre staff that had attended training sessions. All presenters are encouraged to attend the available training both get ready and get started.

Centres are to be congratulated on their efficient administration and prompt delivery of coursework. All centres submitted the Attendance Register, Centre Authentication Form CCS 160 and examination papers correctly filled in and on time.

There is evidence that some centres are becoming systematic in their approach to this diploma, centres should consider the complete learning experience when designing programmes. This is particularly important in relation to learners studying part time alongside real work commitments where they may bring with them a wealth of experience that should be utilised to maximum effect by presenters.

A number of candidates demonstrated a most impressive level of mathematical ability and insight which enabled them to meet the various challenges posed by question papers; precision, command of correct mathematical notation and excellent presentational skills were evident on a number of scripts.

When there are a number of centres in a consortium it is essential that an internal standardisation system is implemented. This would ensure consistent assessment decisions and is a key to good practice. From a rank order point of view this internal standardisation is essential

Individual Units

F556 Engineering business and the environment – Advanced (Centre marked/OCR Moderated)

Assessment Criteria 1.
This was reasonably well answered by the majority of learners. However, virtually all learners chose to look at a typical hierarchal structure with emphasis on the upper echelons of the company. There was limited understanding of other types of businesses and the interaction between levels of management from top to bottom. There was limited reference to career development within a company and the merits of enhancing career prospects through qualification.

Assessment Criteria 2.
Again, many learners were aware of, and tended to concentrate only on the roles and responsibilities of the project manager and failed to appreciate the input from other team members. There was also, limited understanding of the necessity for good time management and answers tended to revolve around availability of supply.

Assessment Criteria 3.
This area was reasonably well answered with most learners appreciating the need to sustain resources and to reduce the amount of pollution generated by industry. Answers however tended to concentrate more on air pollution and the need to save energy by 'switching off lights'.

Assessment Criteria 4.
Learners provided many low level answers showing that they did not understand the possible effects of external environmental factors and how they are managed in an engineering business.

Assessment Criteria 5.
In the main, this question produced some very good answers. Many candidates successfully carried out a chemical analysis of a given soil sample and presented their results in a neat and readable format.

F557 Applications of computer aided designing – Advanced (Centre marked/OCR Moderated)

Assessment Criteria 1.
All learners produced some work to cover this initial criterion. However, some candidates found difficulty in producing well focussed presentations. There was a distinct lack of initial sketching in order to generate early ideas for later modelling. Many learners did not have sufficient skill in producing 2D drawings.

Assessment Criteria 2.
There were a number of drawings submitted that were neat, and extremely well presented. They lacked however, sufficient annotation to convey the details of the modified product.

Assessment Criteria 3.
As mentioned above, many drawings were of a quite good quality but failed to communicate their purpose.

Assessment Criteria 4.
Some learners managed to address this area and, on the whole tended to concentrate on polymer based materials. Where suitable simulation testing was carried out, results were presented in a neat and readable format together with accurate 3D presentation.
Learners struggled with differentiating between the ideas of stress testing, toughness and hardness testing.

Assessment Criteria 5.
A badly answered criteria with very few learners getting past the ' draw it using CAD and then download it to a CAM machine' sort of answer. There is scope for learners to look at and maybe liaise with a local industry. Some learners did mention local industries but failed to acknowledge their source of information.'

Assessment Criteria 6.
Learners did very little in planning and research to correctly identify applications of concurrent engineering within design and manufacturing systems. There was then no formative evaluation of the research.

F563 Mathematical techniques and applications for engineers – Advanced (Externally marked)

It was a pleasure to see so many well presented and clearly argued solutions to the questions from candidates who had clearly developed a very sound understanding of the principles and techniques required for this unit.

Section A – All learners with one exception attempted all fifteen questions.
Section B – All learners attempted three or more questions. When a learner answered more than three questions the three highest marks obtained where recorded. Centres are reminded to encourage learners to attempt three questions only and spend their time on providing accurate and correct answers rather than wasting time on other questions for which they will get no reward.

In a number of cases learners attempted a question and then crossed out the responses. Centres are urged to remind learners that this is not good practice because if necessary a marker can award marks for such questions but sometimes find it difficult to interpret what the learner has written down.

When attempting a question a few learners gave a final answer without showing any working. It is always in the best interest of the learner to show as much detail as possible because if the answer is incorrect nothing can be awarded but if information is provided of how the final answer was arrived at, marks can often be awarded for the methods employed.

Algebra – Generally well answered by all learners.
B1(a) Learners could determine ut = s - ½at2 but could not divide correctly both sides of the equation by t to give a correct final solution
(b) A few learners calculated the acceleration, initial velocity and the distance travelled correctly. The remaining candidates had no idea of what they were doing. In this latter group the ability to solve a simultaneous equation was not well known.

Geometry and trigonometry – In question A7 a number of learners did not get full marks because they did not recognise that cos θ = 4/5 is from a 3, 4, 5 triangle. This information then leads to the correct response of tan θ = ¾.
The formula for the length of an arc of a circle was not well known.
B2 A few candidates calculated the distance AB, the height h and the height of the pole correctly. The remaining candidates had no idea of what they were doing. In this latter group the ability to use the sine rule or the tangent formula was not well known.

Calculus – More attention needs to be given to this section of the unit.
B3 (a) Learners could not correctly differentiate the distance equation to give a formula for the velocity ds/dt. In part (b) learners could not correctly solve a quadratic equation using the formula method. In part (c) learners could not correctly differentiate twice the original distance equation to give a formula for the acceleration d2s/dt2. In part (d) learners substituted zero into the original distance equation which was a meaningless activity.
It would appear that learners need more practice when carrying out integration

Statistics – More attention needs to be given to this section of the unit.
B4 Part (a) of this question was answered correctly by all learners that attempted it. The quality of sketching was to a high standard showing clearly the meaning of each of the different types of distribution curve.
Part (b) was a badly answered question. Learners must be encouraged to construct a table when given data such as maximum load and frequency. The table needed six rows and six columns which then gives direct data for Σf, Σfx and Σf(x-mean)2. From this data the standard deviation and variance can be calculated.

B8 In part (a) not one learner answered this question correctly. The addition law and the multiplication law of probability need to be considered by centres for future examinations. Part (b) was generally well answered by all candidates with very few errors. In a few cases, candidates stated 0.75 instead of deducting the 0.75 from 1 to give the correct result of 0.25.

F556 Engineering businesses and the environment

General Comments

This Unit was initially marked by the centre and then moderated by OCR.

There were only six candidates from one centre entered for this unit and, in general, the work reviewed was of a reasonable standard. Marks ranged from a low of just 2/60 to a high of 27/60

Samples moderated were generally well organised and presented in a neat and readable format.

Virtually all candidates used a local engineering business as their model for covering this unit.

Comments on Individual Questions

Assessment Criteria 1.
Candidates are required to explain the structure of a typical engineering business, identifying, where possible, the various roles of the individuals involved.

This was reasonably well answered by the majority of candidates. However, virtually all candidates chose to look at a typical 'hierarchal structure' with emphasis on the upper echelons of the company. There was limited understanding of other types of businesses and the interaction between levels of management from top to bottom.

There was some limited references to career development within a company and the merits of enhancing career prospects through qualification.

Assessment Criteria 2.
Here, candidates are required to explain the roles and responsibilities of the various members of a project management team.

Again, many candidates were aware of, and tended to concentrate only on the roles and responsibilities of the project manager and failed to appreciate the input from other team members.

There was also, limited understanding of the necessity for good time management and answers tended to revolve around availability of supply.

Assessment Criteria 3.
This area was concerned with environment issues linked to engineering businesses in terms of water and air pollution together with depletion of resources.

This area was reasonably well answered with most candidates appreciating the need to sustain resources and to reduce the amount of pollution generated by industry. Answers however tended to concentrate more on air pollution and the need to save energy by 'switching off lights' when not required.

Assessment Criteria 4.
This criterion is essentially an extension of No 3 and again addresses control and management of environmental pollution problems.

Many answers were vague and candidates seemed not to fully understand what was being asked of them.

Assessment Criteria 5.
Candidates were required to undertake some research into simple chemical analysis with regard to water and soil pollution.

In the main, this question produced some very good answers. Many candidates successfully carried out a chemical analysis of a given soil sample and presented their results in a neat and readable format.

F557 Applications of Computer Aided Designing

General Comments

This Unit was initially marked by the centre and then moderated by OCR.

There were only seven candidates from one centre entered for this unit and, in general, the work reviewed was of a reasonable standard. Marks ranged from a low of just 5/60 to a high of 37/60.

Samples moderated were generally well organised and presented in a neat and readable format.

The stronger candidates performed far better than the weaker ones, suggesting that there was a wide range of candidates entered for this unit.

The unit requires candidates to have a good knowledge of, and to be able to use, a range of both 2D and 3D software packages in order to present a design solution for manufacture, together with giving them the opportunity to use traditional orthographic (2D) presentations.

Candidates were tasked with designing modifications to a standard television monitor stand.

Comments on Individual Questions

Assessment Criteria 1.
Make use of 2D and 3D software to design and model engineered products.

All candidates produced some work to cover this initial criterion. However, the weaker candidates found difficulty in producing neat, well focussed presentations. There was a distinct lack of initial sketching in order to generate early ideas for later modelling.

Many candidates did not have sufficient skill in producing 2D drawings.

Assessment Criteria 2.
Produce accurate and detailed drawings in accordance with British and International Standards.

There were a number of drawings submitted that were neat, and extremely well presented. They lacked however, sufficient annotation to convey the details of the modified product.

Assessment Criteria 3.
This is effectively an extension of Criterion 2 and deals with presentation.

As mentioned above, many drawings were of a quite good quality but failed to communicate their purpose.

Assessment Criteria 4.
Select appropriate materials for design applications and include suitable testing simulation of design ideas.

Only the stronger candidates managed to address this area and, on the whole tended to concentrate on polymer based materials. Where suitable simulation testing was carried out, results were presented in a neat and readable format together with accurate 3D presentation. Candidates struggled however with differentiating between the ideas of stress testing and toughness and hardness testing.

Assessment Criteria 5.
Plan and carry out research in order to identify and evaluate a range of applications of CAD/CAM systems

This question was, in the main very poorly answered with very few candidates getting past the ' draw it using CAD and then download it to a CAM machine' sort of answer. There should be lots of scope for brighter candidates to look at and maybe liaise with a local industry. Some candidates did in fact mention local industries but failed to 'acknowledge their source of information.'

Assessment Criteria 6.
Plan and carry out research to identify and evaluate a range of applications of 'concurrent engineering' within design and manufacturing systems.

Again, this question was very poorly answered even by the 'stronger' candidates. There was very little appreciation as to what the term 'concurrent engineering' actually meant.

F563 Mathematical techniques and applications for engineers

General Comments

It was a pleasure to see so many well presented and clearly argued solutions to the questions from candidates who had clearly developed a very sound understanding of the principles and techniques required for this unit.

Section A – All candidates with one exception attempted all fifteen questions.
Section B – All candidates attempted three or more questions. When a candidate answered more than three questions the three highest marks obtained where recorded. Centres are reminded to encourage candidates to attempt three questions only and spend their time on providing accurate and correct answers rather than wasting time on other questions for which they will get no reward.

In a number of cases candidates attempted a question and then crossed out the responses. Centres are urged to remind candidates that this is not good practice because if necessary a marker can award marks for such questions but sometimes find it difficult to interpret what the candidate has written down.

When attempting a question a few candidates gave a final answer without showing any working. It is always in the best interest of the candidate to show as much detail as possible because if the answer is incorrect nothing can be awarded but if information is provided of how the final answer was arrived at, marks can often be awarded for the methods employed.

Comments on Individual Questions

Section A Fifteen short answer questions

1 Generally well answered by all candidates.

2 A high proportion of candidates did not get full marks because they responded with a(bc + cx) and not with the full response ac(b + x).

3 Generally well answered by most candidates. In a few cases after finding (3x + 6 - 4x – 20)/12 it was disappointing to find candidates could not correctly deal with + 6 and – 20.

4 Generally well answered by most candidates. In a few cases after finding 24 + 6x = 10x – 8 they could not correctly arrive at 4x = 32.

5 A badly answered question. Candidates could not recall the formula for the length of an arc of a circle which is clearly stated in assessment criteria 2.3 together with an example in the exemplification column.

6 Generally well answered by all candidates with the exception of one candidate who did not attempt the question.

7 A number of candidates did not get full marks because they did not recognise that cos θ = 4/5 is from a 3, 4, 5 triangle. This information then leads to the correct response of tan θ = ¾.

8 Generally well answered by all candidates. In a few cases the unit of area was given as mm and not mm2.

9 Generally well answered by most candidates.

10 About 50% of candidates answered this question correctly. Other candidates omitted the minus sign in front of the 12 and did not state sin 3x.

11 About 50% of candidates answered this question correctly. Others could not integrate 12x3 correctly.

12 A badly answered question. Candidates could not integrate 12sin 6x correctly and a high proportion omitted the constant C.

13 Most candidates only achieved half marks with this question because the frequency axis was used as a vertical axis and not as a horizontal axis.

14 Correctly answered by the majority of candidates.

15 Correctly answered by the majority of candidates.

Section B The candidate had a choice of answering three questions from eight.

1(a) Candidates could determine ut = s - ½at2 but could not divide correctly both sides of the equation by t to give a correct final solution.

1(b) A few candidates calculated the acceleration, initial velocity and the distance travelled correctly.
The remaining candidates had no idea of what they were doing. In this latter group the ability to solve a simultaneous equation was not well known.

2 A few candidates calculated the distance AB, the height h and the height of the pole correctly. The remaining candidates had no idea of what they were doing. In this latter group the ability to use the sine rule or the tangent formula was not well known.

3 A few candidates calculated the velocity, time taken when the velocity was zero, acceleration and the time taken when the acceleration was zero correctly. The remaining candidates had no idea of what they were doing.
In part (a) candidates could not correctly differentiate the distance equation to give a formula for the velocity ds/dt. In part (b) candidates could not correctly solve a quadratic equation using the formula method. In part (c) candidates could not correctly differentiate twice the original distance equation to give a formula for the acceleration d2s/dt2. In part (d) candidates substituted zero into the original distance equation which was a meaningless activity.

4(a) Part (a) of this question was answered correctly by all candidates that attempted it. The quality of sketching was to a high standard showing clearly the meaning of each of the different types of distribution curve.

4(b) Part (b) was a badly answered question. Candidates must be encouraged to construct a table when given data such as maximum load and frequency. The table needed six rows and six columns which then gives direct data for Σf, Σfx and Σf(x-mean)2. From this data the standard deviation and variance can be calculated.

5 The least popular question on the paper with candidates achieving very low marks. When the rule was applied of accepting the three questions that gave the highest marks this question disappeared.

In part (a) candidates could not correctly integrate (6s2 +2s) within the limits 6 and 8 leading to an answer for the work done of 620J.
In part (b) candidates could not transpose the formula 2x + y = 7 to give y = 7 – 2x and the formula xy =3 to give y = 3/x. This then meant that the values for x of 3 and ½ could not be correctly determined. The values of x are then the limits for the integration equations. The area under the straight line should have been an integral of 7 – 2x between the limits of ½ and 3. The area under the curve should have been an integral of 3/x between the same limits.

Even when the error carried forward rule was applied many candidates received a very low mark or zero.

6(a) In part (a) candidates could not correctly state the temperature that the heater will approach after operating for a long time is 1000C. The answer is simply taken from the given equation.

6(b) In part (b) a number of candidates incorrectly deducted 80 from 100 leading to an incorrect answer for the time taken for the heater to reach 600C. It was disappointing to see this type of fundamental error on an advanced examination paper.

In part (c) a number of candidates could not correctly differentiate an equation containing an exponential function to give the rate of increase of the temperature.

7 A generally well answered question with candidates applying the sine rule correctly but with some candidates finding the cosine rule more difficult to apply.

8(a) In part (a) not one candidate answered this question correctly. The addition law and the multiplication law of probability need to be considered by centres for future examinations.

8(b) Part (b) was generally well answered by all candidates with very few errors. In a few cases, candidates stated 0.75 instead of deducting the 0.75 from 1 to give the correct result of 0.25.

Grade Thresholds

OCR Level 3 Principal Learning in Engineering H811
June 2009 Examination Series

Unit		Maximum Mark	A*	A	B	C	D	E	U
F556	Raw	60	48	42	36	30	24	18	0
	Points	14	12	10	8	6	4	2	0
F557	Raw	60	48	42	36	30	24	18	0
	Points	14	12	10	8	6	4	2	0
F563	Raw	60	48	42	36	30	24	18	0
	Points	14	12	10	8	6	4	2	0

Specification Aggregation Results

No learners aggregated this series. Aggregation is not available for this specification until June 2010.

For additional guidance on the points awarding system, please refer to the Admin Guide for Diplomas at:
http://www.ocr.org.uk/administration/documents.html?section=general

Statistics are correct at the time of publication.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

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14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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