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GCSE

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Design & Technology

Systems & Control Technology (1974/3974)

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Summer 2006

Examiners' Report

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Summer 2006

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Index

GCSE Design & Technology:
Systems & Control Technology Examiners' Reports

GCSE Design & Technology: Systems & Control Technology
Principal Examiner's Report
Unit 1974, Electronics Foundation Tier

General Comments

Evidence indicates that centres had entered candidates for the correct tier paper. It was pleasing to note that most candidates scored well on both the design and the product analysis questions regardless of tier of entry. Evaluation was still not well done by most candidates. Access to the AO1 questions was better this year and this tended to be reflected in the candidates' answers. The degree of hardness worked well with less able candidates scoring the majority of their marks at the beginning of the papers.

The following comments are focused on each question giving details where candidates scored well and where they gave cause for concern. These comments should be read in conjunction with the published mark scheme.

Foundation Tier (Paper 2F)

Question 1

Q1(a)(i) Most candidates were used to this type of question and answered it well. The switch, speaker and soldering iron were recognised by most although some candidates struggled with the LDR and to a lesser extent the UV light box.

Q1(a)(ii) Those candidates who identified the components and tools were also able to give a reason for each. Some candidates failed to give the reason for the UV light box.

Q1(b)(i) Most candidates could identify at least one of the gates.

Q1(b)(ii) Candidates who had studied gates managed to gain all three marks.

Q1(c) Candidates were familiar with injection moulding and it was not uncommon for them to identify two or three reasons for using the technique.

Q1(d) Most candidates could give at least one advantage for "pick and place" machinery.

Q1(e) A way of collecting and using data from an EPOS till was poorly described by most candidates. Many gave advantages rather than a description of use or did not answer it at all.

Question 2

Q2(a)(i) A high majority of candidates could name an appropriate moving output device.

Q2(a)(ii) A high majority of candidates could name two appropriate sound output devices.

Q2(b)(i) The more able candidates were able to recognise and state the voltage drop.

Q2(b)(ii) Few candidates could use Ohm's Law to calculate the resistance of the LED.

Q2(b)(iii) Most candidates could state the correct resistor to protect the LED.

Q2(c) Candidates who had studied flow charts scored highly, gaining three of four marks. The least well done part was the feedback from the decision diamond.

Q2(d) Most candidates could give at least one advantage to the environment of using solar panels.

Q2(e) Many candidates could give a way that moulded polystyrene could be recycled but few could describe it.

Q2(f) Candidates who recognised the difference between a domestic appliance and a home entertainment system scored two or three marks. Too many could not.

Q2(g) Many candidates could not describe ways is which CAD could be used to help the designer. Many just gave a list of advantages of CAD.

Question 3

Q3(a) Centres that had practiced the design question had candidates who scored very highly on the designs. 10 – 16 marks was not uncommon.

Q3(b) Few candidates, at this level, could evaluate their designs or state anything different from part(a).

Question 4

Q4(a) More candidates were able to give two or three specification points but very few managed to gain all six marks. Many candidates repeated information given in the stem of the question and the generic answers, especially "durable", were still in evidence.

Q4(b) Most candidates could give one reason for the suitability of a seven segment display; many could give two.

Q4(c) Most candidates could give one reason for the suitability of the push-to-make switch; few could give two.

Q4(d) Candidates gave descriptions of properties rather than the properties themselves but these answers were credited as correct.

Q4(e) Candidates at this level had difficulty explaining the reason why aluminium is a suitable material but they were credited half marks when they gave two reasons.

Q4(f) Those candidates who had studied the reed switch understood and could describe the action of the magnet.

Q4(g)(i) Most candidates referred to the aluminium fixing bracket and gained at least one mark.

Q4(ii) Many candidates did not refer back to the original purpose and tried to explain the connection to the reed switch.

GCSE Design & Technology: Systems & Control Technology
Principal Examiner's Report
Unit 1974, Electronics Higher Tier

General Comments

Evidence indicates that centres had entered candidates for the correct tier paper. It was pleasing to note that most candidates scored well on both the design and the product analysis questions regardless of tier of entry. Evaluation was still not well done by most candidates. Access to the AO1 questions was better this year and this tended to be reflected in the candidates' answers. The degree of hardness worked well with less able candidates scoring the majority of their marks at the beginning of the papers.

The following comments are focused on each question giving details where candidates scored well and where they gave cause for concern. These comments should be read in conjunction with the published mark scheme.

Higher Tier (Paper 2H)

Question 1

This is an overlap question between the two tiers.

Q1(a) Most candidates gained four or more marks in this section with less generic specification points being given.

Q1(b) At this level a high majority of candidates could give two reasons for the suitability of the seven segment display.

Q1(c) At this level a high majority of candidates could give two reasons for the suitability of the push-to-make switch.

Q1(d) Most candidates could give two properties of rigid polystyrene that made it suitable.

Q1(e) Most candidates managed to explain at least one reason why aluminium is suitable.

Q1(f) Those candidates who had studied the reed switch understood and could describe the action of the magnet.

Q1(g) Candidates who referred back to the original purposes scored well but some skipped the stem and carried on answering about the reed switch.

Question 2

Q2(a)(i) Many candidates named the three timing components, most gained at least two identifying the variable resistor and the resistor. Some named the 555 timer or did not identify which capacitor.

Q2(a)(ii) Most candidates scored both marks.

Q2(a)(iii) This question was poorly answered by most candidates. They gave the ratio of 2:1 rather than 1:2. The grid which was designed to help may have been a hindrance.

Q2(b)(i)(ii) Most candidates recognised a darlington pair and gave its advantage as a driver.

Q2(c)(i) The exponential curve was answered poorly by many candidates. A good majority scored one mark for starting at zero and climbing rapidly.

Q2(c)(ii) Many candidates did not know the typical base switch-on voltage.

Q2(d)(i) Most candidates could describe a way in which injection moulding creates identical cases.

Q2(d)(ii) Many candidates failed to read the question and did not give an advantage to the manufacturer.

Q2(e) Most candidates could give at least two tasks that could be carried out in CAM to create electronic circuits.

Q2(f) Many candidates answered this poorly. Many repeated the stem in their own words and many gave advantages of CAM.

Question 3

Q3(a) Most candidates gave two different designs and therefore gained very good marks.

Q3(b) A significant number of candidates gained half marks or more for this section. It was also significant that many could not evaluate their designs or give any different information from that in part (a).

Question 4

Q4(a)(i) Most candidates could give a reason for the resistor. Some did not gain the mark because they were protecting the moisture sensor.

Q4(a)(ii)(iii) These were good discriminators as only the more able candidates were able to explain both a reason for the variable and a reason for R1. Many gained a mark for alluding to sensitivity.

Q4(a)(iv) Most candidates gained at least one mark for either the correct figure or the correct unit, few gained both.

Q4(a)(v) Candidates who had studied flow charts scored highly, gaining three of four marks. The least well done part was the feedback from a decision diamond.

Q4(b)(i) Most candidates could give two out of the three advantages of using dedicated ICs.

Q4(b)(ii) Few candidates could describe a disadvantage of using dedicated ICs.

Q4(c) The vast majority of candidates could give two renewable energy sources although some gave the device which converted the source to electricity.

Q4(d) Many candidates could not relate this question to moral issues. Many gave economic or environmental issues but did not link them to a moral theme.

GCSE Design & Technology: Systems & Control Technology
Principal Examiner's Report
Unit 1974, Mechanisms Foundation Tier

General Comments

The quality of the responses to this paper were disappointing and were dominated by a lack of basic mechanical systems knowledge from the majority of candidates. Core mechanical elements such as belts, pulleys and gear-trains and their application are obviously poorly understood.
It would appear that the paper made the same demands on candidates as those of previous series. However, question 3 in parts seemed to offer the vast majority of candidates major hurdles to overcome.

Question 1 was a well answered question. It had elements of discrimination that worked well and had ample opportunity for candidates to show what they know.

Question 2, part (c) was the only part that presented a problem to the majority of candidates as knowledge of cams and followers was poor and often confused and superficial.

Question 3, the design question, presented some significant problems. Not only was the quality of solutions offered by most candidates severely hampered by poor understanding of basic mechanical drive systems but the rubric was very rarely adhered to. The degree of deviation from the question requirements resulted in much of the mark scheme not being accessible to most candidates.

Systems for securing the drive mechanisms to the output shaft were poorly understood and often ignored.

Materials and associated manufacturing processes for one chosen component were also elements that were not well understood and again many candidates chose to ignore these requirements.

The quality of sketching was poor and did not often support the candidates' responses.

Question 4 was, for the most part, a very successful question, eliciting informed and accurate responses from the majority of candidates and giving them an opportunity to show what they know.

However, it was noticeable that few candidates understood the meaning of a material 'property' and there was much confusion associated with levers and the concept of leverage. There was no use of the term 'moment' in responses to part (f).

GCSE Design & Technology: Systems & Control Technology
Principal Examiner's Report
Unit 1974, Mechanisms Higher Tier

General Comments

As with paper 3F, the quality of candidates' responses to this paper were disappointing and were dominated by a lack of basic mechanical systems knowledge from the majority of candidates. The application and essential elements of mechanisms such as the 'rack and pinion' and 'crank and slider' were particularly poorly understood. Both questions 3 and 4 in parts seemed to offer the vast majority of candidates major hurdles to overcome as can be seen by candidate performance in these questions.

Question 1 was, for the most part, a very successful question, eliciting informed and accurate responses from the majority of candidates and giving them an opportunity to show what they know.

However, it was noticeable that few candidates understood the meaning of a material 'property' and there was much confusion associated with levers and the concept of leverage. There was little use of the term 'moment' in responses to part (f).

Question 2 was also generally solidly answered by the majority of candidates. It was a successful question in terms of accessibility and discrimination. There were very few correct responses to part (a)(ii) however, which indicated a very poor understanding of lamination and 'laminated' materials. 'Pick and place' was not at all understood by more than a handful of respondents.

Question 3, the design question, presented a major problem. Not only was the quality of solution offered by most candidates severely hampered by very poor understanding of basic mechanical systems but the rubric was very rarely adhered to. The degree of deviation from the question requirements resulted in much of the mark scheme not being accessible to most candidates.

Materials and associated manufacturing processes were also elements that were not well understood and again many candidates chose to ignore these requirements.

The quality of sketching was poor and did not often support the candidates' responses.

Questions 4 Candidates' performance in 4 (b) and (c) was also very poor. The basic knowledge was missing to answer (b) and there were no totally correct responses to (c). Candidates were obviously totally unfamiliar with bicycle cotter pins.

GCSE Design & Technology: Systems & Control Technology
Principal Moderator's Report
Unit 1974, Coursework

Electronics

During the moderation of the coursework it is has been quite noticeable that a number of centres have established a range of resources to promote the development of Systems and Control (electronics). Further developments with computer software that can be used to design and test electronic circuits are now commonplace in a number of centres. A number of these centres now offer their candidates the opportunity to use professional processes to deliver high levels of practical outcome. In particular, many centres now use focused tasks which use similar electronic sub-systems as the basic foundation for each project. It was noticeable that many centres often awarded high marks for the design and development sections when it is often difficult to find any discriminating evidence to support the high mark award**.** It is my view that, as resources have moved on, more shortcuts have become available to candidates who often now move their designs forward based on limited knowledge and understanding.

The growing use of computer software being used to solve and support the development of circuit design has, for the moderator, produced new issues to be addressed. More than ever there is a need for the moderator to focus on the understanding the candidate demonstrates at each stage of the designing process. In particular, a commentary where a candidate is able to provide their own review of each stage, is now essential if he/she is to demonstrate knowledge and understanding of the skills and processes being used. Where candidates recognise the need continually to measure and test each stage of the designing process against carefully considered specification points, they have mostly been successful**.**

For some centres the introduction of computer software has led some candidates to leave enormous gaps in their work. Many demonstrate very little ability to understand important features in a design idea. Unfortunately it was not uncommon to see computer generated circuit designs which were given high marks by the centre yet these marks could not be supported by any clear evidence. Although design work often led to professional looking outcomes, many were simply cut and paste exercises with little evidence of a candidate having demonstrated any real understanding. These examples mostly lacked any real analysis of the ideas with little or no evidence of how modelling or testing was used to move a project forward. Opportunities for 3D and 2D testing were often overlooked.

Progress is being made by a number of well organised centres. More do, as we have requested in previous U9 reports, limit the folders to 20 pages, provide improved photographic evidence and provide clear annotation directing the moderator to the required evidence. There are now I feel some centres who have developed a very good understanding of the course

requirements and who often produce a standard of work beyond KS4 level. It is pleasing to recognise the work of a number of centres who have continued to respond to the requirements of this course by annually submitting design folders of a very high standard and they are to be congratulated.

On the other hand and unfortunately, some centres still appear to have lower expectations and offer coursework outcomes where the levels of skill and understanding barely exceeds that of KS3. It is these centres where a moderator often reports that the centre mark is too generous and adjustments are made.

Mechanisms

Only a limited number of centres offered mechanisms coursework and of those seen many were generously marked by the centres. Too often the design ideas were simplistic and led to modelled outcomes using mostly simple mechanical processes. It is rather disappointing that more centres have not encouraged candidates to study and enter this area of systems and control.

Feedback from Moderators

- Overall impression is that candidates are getting better at fulfilling the course requirements.
- **Section 1** More candidates are given focused tasks and many are simply using internet downloads without discriminating or analysing the information. With some centres this results in a lot of repetitive and similar outcomes to this section.
- The review section often follows the level of specification. Simple specification statements often led to limited reviews. I have previously stated the need for candidates to use the specification as the main focus throughout the designing process.
- **Section 4** Systems & Control is still rather poorly attempted by many and, as in previous years, there is a failure to recognise INPUTS-PROCESSES-OUTPUTS. There is still the need for candidates to label their system diagrams or use a key to identify elements including where feedback can be used to trigger quality control.
- Each year the photographic evidence has improved.

GCSE Design & Technology: Systems & Control Technology
Unit 3974, Electronics Foundation Tier
Unit 3974, Electronics Higher Tier
Unit 3974, Mechanisms Foundation Tier
Unit 3974, Mechanisms Higher Tier
Unit 3974, Coursework

Introduction

The low number of entries for the short course makes it difficult to provide comments on the performance of the candidates. However, the comments made on the full course common questions or elements are relevant and helpful for the short course

General Comments

Very few short course candidates chose to enter a Mechanisms paper or to submit coursework. In the Electronics papers it was pleasing to note that the trend towards improving on the product analysis question was also evident in the short course.

GCSE Design & Technology: Systems & Control Technology
(Full Course: 1974)

Grade Boundaries – Summer 2006

Overall Grades – Electronics

The figures given below are the minimum subject marks required for each overall grade in the summer 2006 examinations.

(Foundation Tier out of 100)

C	D	E	F	G
54	44	34	24	14

(Higher Tier out of 100)

A*	A	B	C	D	E
82	71	60	50	38	23

Overall Grades - Mechanisms

The figures given below are the minimum subject marks required for each overall grade in the summer 2006 examinations.

(Foundation Tier out of 100)

C	D	E	F	G
49	39	30	21	12

(Higher Tier out of 100)

A*	A	B	C	D	E
74	64	54	45	36	31

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2006 examination.

(Coursework 01 out of 102)

A*	A	B	C	D	E	F	G
92	80	68	56	45	34	23	12

(Paper 2F out of 88)

C	D	E	F	G
48	39	30	22	14

(Paper 2H out of 88)

A*	A	B	C	D	E
59	52	45	38	26	20

(Paper 3F out of 88)

C	D	E	F	G
41	23	24	16	8

(Paper 3H out of 88)

A*	A	B	C	D	E
51	43	35	27	22	19

GCSE Design & Technology: Systems & Control Technology
(Short Course: 3974)

Grade Boundaries – Summer 2006

Overall Grades – Electronics

The figures given below are the minimum subject marks required for each overall grade in the summer 2006 examinations.

(Foundation Tier out of 100)

C	D	E	F	G
53	43	33	23	13

(Higher Tier out of 100)

A*	A	B	C	D	E
81	70	59	49	38	32

Overall Grades - Mechanisms

The figures given below are the minimum subject marks required for each overall grade in the summer 2006 examinations.

(Foundation Tier out of 100)

There were no entries for this option.

(Higher Tier out of 100)

There were no entries for this option.

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2006 examination.

(Coursework 01 out of 84)

A*	A	B	C	D	E	F	G
76	66	56	46	37	28	19	10

(Paper 2F out of 44)

C	D	E	F	G
23	18	14	10	6

(Paper 2H out of 44)

A*	A	B	C	D	E
29	25	21	18	13	10

(Paper 3F out of 44)

There were no entries for this option.

(Paper 3H out of 44)

There were no entries for this option.

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