Version 1.0 18/08/06

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Design and Technology: Systems and Control Technology *Specification*

SCT6

Mark Scheme

2006 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Quality of Written Communication

The following marks are allocated to the quality of the candidate's written communication. Make a separate assessment of the candidate's overall ability as demonstrated across the paper using the criteria given below.

Performance Criteria	**Marks**
The candidate will express complex ideas extremely clearly and fluently. Sentences and paragraphs will follow on from one another smoothly and logically. Arguments will be consistently relevant and well structured. There will be few, if any, errors of grammar, punctuation and spelling.	4
The candidate will express moderately complex ideas clearly and reasonably fluently, through well-lined sentences and paragraphs. Arguments will be generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.	3
The candidate will express straightforward ideas clearly, if not always fluently. Sentences and paragraphs may not always be well connected. Arguments may sometimes stray from the point or be weakly presented. There may be some errors of grammar, punctuation and spelling, but not such as to suggest a weakness in these areas.	2
The candidate will express simple ideas clearly, but may be imprecise and awkward in dealing with complex or subtle concepts. Arguments may be of doubtful relevance or obscurely presented. Errors in grammar, punctuation and spelling may be noticeable and intrusive, suggesting weaknesses in these areas.	1

NB This mark scheme is intended as a guide to the type of answer expected but is not intended to be exhaustive or prescriptive. If candidates offer other answers which are equally valid **they must be given full credit.**

Many responses at this level are assessed according to the **quality** of the work rather than the number of points included. The following level descriptors are intended to be a guide when assessing the quality of a candidate's response.

Low mark range
The candidate has a basic but possibly confused grasp of the issues.
Few correct examples are given to illustrate points made. Description may be unclear.

Mid mark range
The candidate has some knowledge but there will be less clarity of understanding.
Some correct examples given to illustrate points made. Description better but unclear or confused in parts.

High mark range
The candidate has a thorough understanding of the issues and has provided relevant examples to support the knowledge shown. This candidate's answer shows clear evidence of understanding.

SCT 6

Question 1

Suitable test for the property	*2 marks*	
Appropriate size of sample for test rig	*1 mark*	
Appropriate method of applying load	*1 mark*	
Appropriate magnitude of load	*1 mark*	
Identification of data to collect	*1 mark*	
Suitable / accurate method of collecting data	*1 mark*	
Explanation of data analysis	*2 marks*	**3 max 8 marks**
		24 marks

Question 2

(a)	Conversion of rotary to linear motion	*4 marks*	
	Drive system from stepper motor	*2 marks*	
	Suitable system to provide 500mm of movement	*2 marks*	
	Method providing 0.1mm accuracy	*4 marks*	
	Appropriate calculations for accuracy	*4 marks*	**max 14 marks**
(b)	Readily available component	*1 mark*	
	Readily available driver chips	*1 mark*	
	Do not require feedback	*2 marks*	
	Available in different step angles	*1 mark*	
	Precise movements	*1 mark*	
	Speed of steps can be variable	*2 marks*	
	Can be ramped up or down	*1 mark*	
	Easily interfaced	*1 mark*	
	Movement can be precisely co-ordinated on multiple axis	*3 marks*	**max 10 marks**
			24 marks

Question 3

(a)	All answers should refer to the stated product		
	Reference to the product or manufacturing method		
	Explanation of the type of pollution	*2 marks*	
	Explanation of how the pollution is produced	*2 marks*	**4 max 4 marks**
(b)	Description of modification	*2 marks*	
	Description of how pollution is reduced	*2 marks*	**2 max 4 marks**
			24 marks

Question 4

(a)	Identification of the type of information to be gathered	*2 marks*	
	Suitable method matched to the situation	*1 mark*	
	Description of information gathering technique	*2 marks*	
	Description of how the data is presented	*2 marks*	**max 6 marks**
(b)	Easy of communication	*1 mark*	
	Better stock control	*1 mark*	
	Analysis of data	*2 marks*	
	Mathematical modelling to predict trends	*2 marks*	
	Ease of modification to designs using CAD	*2 marks*	
	Modelling of modifications for ease of market research	*2 marks*	
	Ease of modification using CAM	*2 marks*	
	No need for retooling	*2 marks*	**max 12 marks**
			24 marks

Question 5

(a)	Labelling of input-process-output	*1 mark*	
	Input Sensors		
	Pilot Light	*1 mark*	
	Pump	*1 mark*	
	Temperature	*1 mark*	
	Process		
	Gate array	*1 marks*	
	Output		
	Gas valve	*1 mark*	**6 marks**
(b)	Suitable sensing system with description	*2 marks*	
	Method of providing positive output	*2 marks*	**2 x 4 marks**
(c)	Input sensing systems	*4 marks*	
	Decision making system	*2 marks*	
	Output to gas valve	*1 mark*	
	Interconnection of parts	*2 marks*	
	Description of operation	*2 marks*	**max 10 marks**
			24 marks

Question 6

(a)	Candidates will use specific applications to discuss the following		
	Lack of technical skill to program	*2 marks*	
	Flexible use for different situations	*2 marks*	
	Ease of reprogramming	*2 marks*	
	Relatively expensive	*1 mark*	
	Need for interfacing	*2 marks*	
	Can over complicate design	*2 marks*	
	Skilled maintenance engineers	*2 marks*	
	Less robust	*1 mark*	**max 12 marks**
(b)	Description of input energy	*2 marks*	
	Description of suitable storage system for magnitude	*6 marks*	
	Description of release system for energy	*4 marks*	**12 marks**
			24 marks
			Paper Total 96 Marks