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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Design and Technology: Systems and Control Technology 5556/6556 SCT 6

Mark Scheme

2007 examination - June series

For Publication

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.

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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.

1 (a) Cedar, Larch – Weather resistant, waterproof, vandal resistant, capable of taking surface finish, fabricated or moulded, batch produced, rot resistant, tough, etc.

(b) Glass, PET – Colourful, non toxic, capable of moulding into complex shape, possible textured finish, mass produced, injection moulded or blow moulded, suitable plastic to match process

(c) Copper – Must be good conductor, possible to shape, can be wetted by solder, higher melting point than solder, suitable for coating, **copper?**

(d) HSS, Cobalt Steel, HCS, Tungsten Carbide – Will be mass produced, large forces involved, needs accurate machining, tough, withstands high temperatures, heat-treated, must be hard and wear resistant, High Speed Steel

(4 x 6 marks)

24 marks

2 (a) Each suitable stage – description 1 mark – correct order – 1 mark.
E.g. Track design, overlay, photo exposure, development, etching, washing, tinning, drilling, etc. *(8 marks)*

(b) Each suitable test description 1 mark – reason 2 marks *(2 x 3 marks)*

E.g. Hole penetration – ensure correct insertion of components
Electrical continuity or short circuits – correct operation of completed board, etc.

(c) Simplistic answer giving basic information regarding programmable integrated devices *(1-4 marks)*

Good answer making reference to the advantages and limitations of programmable devices, answers limited to general descriptors, limited technical content *(5-7 marks)*

Excellent answer, specific advantages and limitations, reference to 240V a.c., good technical understanding, examples given *(8-10 marks)*

24 marks

3	(a)	Each relevant example 1 mark – supported by reason 1 mark – Well explained 1 mark e.g. Croc slip simulations – flowcharts – CAD for 3D representation modification, testing – Mathematical modelling/testing – costing – production modelling – online surveys, etc.	*(16 marks)*	
	(b)	Each relevant example 1 mark – supported by reason 1 mark – Well explained 1 mark e.g. Quick to reset equipment, lower tooling costs than jigs and fixture, versatile equipment, slower speed of production than jigs, etc.	*(8 marks)*	
				24 marks
4	(a)	Manufacturer – Constant re-design, modification, tooling costs, retraining, changing marketplace, openings for new products, etc. Repair service – retraining, expensive test equipment, updating stock, etc. Consumer – Better products, in built obsolescence, difficult to get repaired, constant need to upgrade etc. Ease of construction, repeatability, accuracy, use of less skilled workforce, etc.	*(3 x 4 marks)*	
	(b)	Suitable product	*(2 marks)*	
		Simplistic answer giving basic information regarding generic developments	*(1-3 marks)*	
		Good answer linking specific developments to the product selected	*(4-7 marks)*	
		Excellent answer linking specific developments to the product with explanations of how these allowed the product to develop	*(8-10 marks)*	
				24 marks

5	(a)	Each correct stage in order Comparison – feedback loop	*(1 mark)* *(2 marks)* *(12 marks max)*	
	(b)	Sensing system Suitable Interfaces Correct interconnections Explanation/Program	*(2 marks)* *(2 x 2 marks)* *(4 marks)* *(4 marks)* *(12 marks max)*	**24 marks**
6	(a)	Harnessing power Conversion to electrical output Identification of energy conversions Quality of communication	*(2 x 2 marks)* *(2 x 2 marks)* *(2 x 2 marks)* *(2 x 2 marks)*	
	(b)	Each relevant example Supported by reason Well explained	*(1 mark)* *(1 mark)* *(1 mark)* *(8 marks max)*	**24 marks**