Version 1.0: July 2008

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

A2 Design and Technology
Systems and Control Technology
6556

SCT6 Written Paper

Mark Scheme

2008 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.

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Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General*

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.

A1 (a) Mild steel – galvanised or Stainless steel – weather resistant, heat resistant, fabricated or formed, batch produced, rot resistant, tough etc.

(b) Brass or Silver or Platinum, PET – good electrical conductor – tarnish resistant, hard surface, pressed, stamped, cast or machined, batch or mass produced, may require soldering

(c) Suitable wood – metal or plastic – must be weather resistant, possible to shape, vandal resistant, flame resistant, easily cleaned, colourful

(d) Mild steel or aluminium – rigid – high strength – resistant to weather – ability to take protective coating – suitable for taking paint – one off production

Maximum (4 × 6 marks)

24 marks

A2 (a) (i) Belt in contact with pulley – high friction contact – shaped to increase friction – rotary motion transferred to belt (linear) – motion transferred to second pulley by friction – pulley coverts back to rotary motion

Suitable sketch (2 marks)

Each point (1 mark)

Maximum (6 marks)

(ii) Belt teeth engage in pulley – rotary motion transferred to belt (linear) – motion transferred to second pulley by friction – pulley converts back to rotary motion

Suitable sketch (2 marks)

Each point (1 mark)

Maximum (6 marks)

(iii) Chain shaped to fit gear – chain in tension – rotary motion transferred to chain (linear) – chain moves between gears – gear converts back to rotary motion

Suitable sketch (2 marks)

Each point (1 mark)

Maximum (6 marks)

(b) Belt and pulley – light loads – cheap – quiet – can slip – safety feature if it slips
Cogged belt – quiet – medium loads – good for indexing – relatively cheap
Chain and Sprocket – large loads – expensive – good for indexing – noisy – constant maintenance, – etc.

Each point (1 mark)

Maximum (6 marks)

24 marks

B3 (a) Machines are versatile – can cut range of materials – only limit is physical size – easily reconfigured – reprogrammed – little re-tooling involved – CAD allows simple modification of existing designs – use of parts library – various designs can be stored – designs can be modelled prior to manufacture – fast turn round between jobs

Each point (1 mark)

Maximum (8 marks)

(b) Provides a clear identification of – the separation component – processes – time requirements for each process – the assembly requirement – assembly order – the allocation of resources – possible problems within the process – identification of necessary modifications – etc.

Each point (1 mark)

Maximum (6 marks)

(c) Large set up costs – specialist equipment – semi skilled labour – high unit cost at start – low unit cost over time – inflexible – one part stops all stops – difficult to adapt products quickly – good for standard products/components – not good for products that follow trends – equipment can be limited to single product – major re-tooling needed to change product

Each point (1 mark)

Maximum (10 marks)

24 marks

B4 Relevant piece of anthropometric data (1 mark)

Supporting sketch (1 mark)

Reason (1 mark)

Application of data (1 mark)

Maximum (6 × 4 marks)

24 marks

C5 (a) For example – more versatile- allowing much more complex operations from a single chip- smaller pcb's – possible to modify operation – single system can be reprogrammed for variety of applications – less electronic knowledge required – cheaper production costs – etc.

Each point (1 mark)

Maximum (6 marks)

(b) Method of switching (1 mark)

(i) Suitable for 250V ac (1 mark)

Suitable for 30 amps (1 mark)

Circuit diagram & explanation (3 marks)

Maximum (6 marks)

(ii) Method of switching (1 mark)

Method of reversing (2 marks)

Circuit diagram & explanation (3 marks)

Maximum (6 marks)

(iii) Method of switching (1 mark)

Activation of pneumatic control (2 marks)

Circuit diagram & explanation (3 marks)

Maximum (6 marks)

24 marks

C6 (a) Smaller size of batteries – greater power output – greater storage capacity – less weight – allowed greater time before recharge – flexibility of design – more functions – greater range – higher torque for drill – higher voltages in same space – etc.

Examples used could be: MP3 player – mobile phone – portable drill

Each point (1 mark)

Maximum (12 marks)

(b) Describe the relative advantages of mechanical, electrical and pneumatic systems as methods of storing and transferring energy

Mechanical – simple – costly – large force transfer – difficult to install – limited to rotary and linear – limited methods of storing – etc.

Electrical – clean – easily distributed – dangerous in certain situations – easily modified – easily converted to different forms – stored in a variety of ways – etc.

Pneumatic – clean – safe in dangerous places – easily transported – large forces – cannot overload – can be stored in receiver – produce linear or rotary output – etc.

Each point (1 mark)

Maximum (12 marks)

24 marks