Version 1

General Certificate of Education (A-level)
June 2011

Design and Technology: Systems and Control Technology

SYST3

(Specification 2555)

Unit 3: Design and Manufacture

Final

Mark Scheme

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Question 1			
0 1	Suitable test for the property Appropriate size of sample for test rig Appropriate method of carrying out test Identification of data to collect Suitable / accurate method of collecting data Explanation of data analysis ***Maximum for Question 4 x 7 marks***	*2 marks* *1 mark* *2 marks* *1 mark* *1 mark* *2 marks*	Max 7 mark
Question 2			
0 2	Medium carbon steel or Cast Iron or Wrought Iron - Wear resistant, Hardness, heat resistant, compressive strength, batch/mass produced, toughness to withstand impact, cast or forged etc. ***Each point with reason 1 mark***	*7 marks*	
0 3	Suitable wood or plastic or glass or stone – Rigid – scratch resistance – toughness – will not blunt knife - resistant to moisture – multiple production – hygienic – non reactive – easily cleaned – method of forming – self sealing – fabrication – Injection moulding – visual appearance. ***Each point with reason 1 mark***	*7 marks*	
0 4	Suitable plastic or glass - Must be transparent, possible to shape, scratch resistant, rigid, wear resistant, impact resistant, easily cleaned, non toxic, batch or mass produced, etc. ***Each point with reason 1 mark***	*7 marks*	
0 5	Suitable Ceramic or Steel or Non Ferrous or Plastic - Rigid – heat resistant – resistant to corrosion – ability to take protective coating – Easily cleaned – Hygienic – batch or mass production – forming process – etc.	*7 marks*	
Question 3			
0 6	Suitable method Quality of sketches Explanation of process e.g. Injection moulding	*2 marks* *2 marks* *6 marks*	Max 10 marks
0 7	Suitable method Quality of sketches Explanation of process e.g. Pressing	*2 marks* *2 marks* *6 marks*	Max 10 marks
0 8	Larger products can be produced, not limited by machine size – Easier to transport, can be disassembled – Parts can be made in different places by different manufacturers – Appropriate materials, specific properties can be used for each part – etc **Each advantage with explanation – 2 marks**	*4 x 2 marks*	Max 8 marks
Question 4			
0 9	Quality of sketches Suitable system Explanation of systems operation Conversion to electrical output Identification of energy conversions ***2 x 8 marks max***	*1 mark* *1 mark* *2 marks* *1 mark* *3 marks*	16 marks

1 0	E.g. Windpower Suitable because of many available sites – Produces less pollution but can be said to provide visual and noise pollution – Operating costs limited to maintenance – Only suitable as part of integrated energy system because wind does not blow at all times – etc E.g. Gas Cheap set up cost compared to other fossil fuel methods – Fuel source finite, expensive, running out in UK, has to be imported – Continuous supply – Outputs greenhouse gases – Easily decommissioned – etc. ***Each relevant point with reason - 2marks***		Max 12 marks
Question 5			
1 1	**DC Motors** Available in many sizes, free to rotate when power off, high speed, low torque, work of many voltages, need gearing down to reduce speed, increase torque, over run when switched off, need a sensing system, need feedback, prone to hunting, produce rotary motion, cost effective, easily reversed, need system to convert to linear motion etc. **Stepper Motors** Precise steps, can be locked in place, steps normally limited to 1.8 or 7.5 degrees, need gearing to provide more precise movement, digital output, low maximum speed, need ramping for accurate control, can be used in open loop systems, produce rotary motion, easily reversed, need system to convert to linear motion etc. ***Each relevant point 1 mark***		Max 16 marks
1 2	Quality of diagram Suitable speed of movement Suitable sensing system Feedback system Comparator and Control system.	*2 marks* *2 marks* *2 marks* *2 marks* *4 marks*	12 marks
Question 6			
1 3	Relevant piece of anthropometric data Supporting Sketch Reason Application of data **4 x 4 marks max**	*1 mark* *1 mark* *1 mark* *1 mark*	16 marks
1 4	Quality of sketches Application of drive force Application of braking force Method of ensuring fair test Data that needs to be collected Method of collecting the data How the data is compared	*2 marks* *2 marks* *2 marks* *2 marks* *2 marks* *2 marks* *2 marks*	12 marks

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