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**General Certificate of Education
June 2010**

**Design and Technology:
Systems and Control Technology SYST3**

Unit 3

Final

Mark Scheme

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Q 1			
0 1	Suitable system for transfer of energy	2 x 1 mark	
	Clear diagram	2 x 2 marks	
	Main parts labelled	2 x 1 mark	
	Descriptions of transfer:	2 x 4 marks	
	(Exemplar answers - each point 1 mark)		
	Belt and Pulley		
	Rotary motion transferred to pulley		
	Belt in contact with pulley		
	High friction contact		
	Shaped to increase friction		
	Rotary motion transferred to belt (linear)		
	Belt moves between pulleys		
	Motion transferred to second pulley by friction		
	Pulley converts back to rotary motion		
	Motion transferred to shaft.		
			16 marks
0 2	(Exemplar answers – each point 1 mark)		
	Belt and pulley – light loads – cheap – quiet – can slip – safety features if slips		
	Cogged belt – medium loads – good for indexing – relatively cheap		
	Chain and Sprocket – Large loads – Expensive – good for indexing – noisy – constant maintenance etc.		
			6 marks
0 3	Suitable Method	1 mark	
	Clear Sketch	2 marks	
	Main parts labelled	1 mark	
	Description of operation	2 marks	
			6 marks

Q2			
0 4	Relevant piece of anthropometric data	4 x 1 mark	
	Supporting Sketch	4 x 1 mark	
	Reason	4 x 1 mark	
	Application of data	4 x 1 mark	
			16 marks
0 5	Suitable product (e.g. Car)	1 mark	
	Each relevant point	1 mark	
	Each explanation or reason – Up to	2 marks	
			12 marks

Q3			
0 6	Each relevant example	1 mark	
	Supported by reason	1 mark	
	Well explained	1 mark	
	E.g. Speed of production, easily changed, can test on screen, low cost, no wastage, flexibility, wide		

	range of components, computer fault finding, etc. Does not represent actual size, not all parameters represented, high set up cost, not all components available, training requirements.		
			16 marks
0 7	Each relevant example	1 mark	
	Supported by reason	1 mark	
	Well explained	1 mark	
	i.e. 3D models for gathering user opinion on aesthetics, computer models of function and to test theories, models for testing material suitability, testing to destruction etc.		
			12 marks

Q4			
0 8	Suitable prime mover	2 marks	
	Drive system for prime mover / or feedback	4 marks	
	Drive system from prime mover to turntable	2 marks	
	Method providing 0.05 degrees of accuracy	2 marks	
	Appropriate calculations/conversions for accuracy	4 marks	
			14 marks
0 9	Input network	2 marks	
	Ramp voltage generation	2 marks	
	Counting system	2 marks	
	Comparison system	2 marks	
	Output system	2 marks	
	Quality of diagram with interconnections	4 marks	
	Explanation of operation	4 marks	
			14 marks (max)

Q5			
1 0	Suitable process for identified plastic	2 x 1 mark	
	Permanent method	2 x 1 mark	
	Description of process	2 x 3 marks	
			10 marks
1 1	Suitable process for identified non-ferrous metal	2 x 1 mark	
	Permanent method	2 x 1 mark	
	Description of process	2 x 4 marks	
			12 marks
1 2	Each problem with a reason	3 x 2 marks	
	E.g. Distortion, melting previous joints, oxidization of surface, need for flux, removal of flux, expansion, changing properties, cleaning the joint before and after etc.		
			6 marks

Q6			
1 3	Suitable sensing system start	2 marks	
	Suitable sensing system end	2 marks	
	Suitable timing system	2 marks	

	Suitable Output driver	2 marks	
	Suitable Output display	2 marks	
	Reference units	1 mark	
	Quality of sketches	2 marks	
	Interconnections and description	4 marks	
			16 marks (max)
1 4	Large forces produced	1 marks	
	Can push and pull	2 marks	
	Variable speed on both strokes	2 marks	
	Minimal parts	1 mark	
	Suitable for use in hazardous situations	1 mark	
	Variable lengths of movement	1 mark	
	Equal force available at all positions of stroke	2 marks	
	Reasonably safe if leak occurs not like electricity	1 mark	
	Can be noisy	1 mark	
	Requires compressed air source	1 mark	
	Direct linear motion	1 mark	
			8 marks (max)
0 15	Unequal areas of piston	1 mark	
	Piston rod reduces area of piston on in stroke	1 mark	
	Less area for air pressure to act on	1 mark	
	Force = surface area x air pressure	1 mark	
			4 marks