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General Certificate of Education (A-level)
June 2011

Design and Technology: Systems and Control Technology

SYST1

(Specification 2555)

Unit 1: Materials, Components and Application

Final

Mark Scheme

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1 (a)	Converts sensed input into electrical change	*(1 mark)*	
	Example	*(1 mark)*	**2 marks**

1 (b)	Converts electrical energy into suitable output	*(1 mark)*	
	Example	*(1 mark)*	**2 marks**

2 (a)	Part of output fed back to input	*(1 mark)*	
	Feedback signal modifies input	*(1 mark)*	**2 marks**

2 (b)	A form of rotary motion	*(1 mark)*	
	Changes direction automatically	*(1 mark)*	**2 marks**

3	**Naming of method** Joint preparation How heat is used Joint production including sketch	*(1 mark)* *(1 mark)* *(1 mark)* *(2 marks)*	**4 marks maximum**

4 (a)

A	B	C	Q
0	***0***	***0***	0
0	***0***	***1***	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

All possible combinations of A, B and C *(1 mark)*
Every 2 correct output lines (4 possible pairs) *(4x1 mark)*

5 marks maximum

4 (b)	Correct drawing of a SPDT	*(1 mark)*	
	Correct connections	*(1 mark)*	**2 marks**

4 (c)	To avoid incorrect/random inputs/floating voltages	*(1 mark)*	**1 mark**

5 (a) (i)	Suitable method of producing a time delay Description of operation Works from a momentary switch push A method of activating 240 volt supply Capable of working for 10 minutes Calculations included Correct result from calculations	*(1 mark)* *(2 marks)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)*	**8 marks**

5 (a) (ii)	Suitable method of producing a time delay Description of operation Works from a momentary switch push A method of activating 240 volt supply Capable of working for 10 minutes Calculations included Correct result from calculations	*(1 mark)* *(2 marks)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)*	**8 marks**

5 (b)	Suitable method of adjustment with explanation Appropriate calculation included Results cover required range	*(2 marks)* *(1 mark)* *(1 mark)*	**4 marks**

6 (a) (i)	Suitability of system Sketch showing parallel shafts Main components labelled Method of transferring motion shown Method of transferring motion explained Method of amplifying motion shown Method of amplifying motion explained	*(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)*	**7 marks**

6 (a) (ii)	Suitability of system Sketch showing parallel shafts Main components labelled Method of transferring motion shown Method of transferring motion explained Method of amplifying motion shown Method of amplifying motion explained	*(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)*	**7 marks**

6 (b)	Input motion clearly explained as reciprocating Output clearly explained as Clockwise rotary Suitable system to provide function Explanation of how conversion takes place	*(1 mark)* *(1 mark)* *(2 marks)* *(2 marks)*	**6 marks**

7 (a)	Suitable Sensor 1 mark Appropriately placed 1 mark Appropriately connected / Suitable Output 1 mark Quality of sketch and explanation 1 mark If only detects single level Max 2 marks	*(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)*	**4 marks**

7 (b) (i)	Suitable system Conversion to rotary motion Clear explanation of how conversion takes place	*(1 mark)* *(1 mark)* *(1 mark)*	**3 marks**

7 (b) (ii)	Suitable system Conversion to rotary motion Clear explanation of how conversion takes place	*(1 mark)* *(1 mark)* *(1 mark)*	**3 marks**

7 (c)	Activation device Sensing system Production of electrical output pulse	*(1 mark)* *(1 mark)* *(2 marks)*	**4 marks**

7 (d)	Input shown Suitable method of counting used Explanation of how count is achieved / functions Suitable timing system shown Interconnections between timer/counter shown Explanation of operation Output / Display shown Output / Display operation explained	*(1 mark)* *(1 mark)* *(2 marks)* *(2 marks)* *(1 mark)* *(1 mark)* *(1 mark)* *(1 mark)*	**10 marks**

7 (e)	**Materials and construction:** Suitability of Materials Suitability of jointing/interconnections **How and where the system is placed in the river:** Fixing to bank / river bed How a datum is achieved for water level indicator **Assembly of the sub-systems:** Quality of Diagrams/Communication Interconnections of sub-systems Mounting of systems **The Indication and display system:** Suitability of display systems 1 mark Calibration indicated 1 mark	 *(2 marks)* *(2 marks)* **Max 4 marks** **(***1 mark)* *(1 mark)* **Max 2 marks** *(4 marks)* *(2 marks)* *(2 marks)* **Max 8 marks** **(1 mark)** **(1 mark)** **Max 2 marks**	**16 marks**

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