Version 0.3

General Certificate of Education June 2010

Design and Technology: Systems and Control Technology

SYST1

Unit 1

Final

Mark Scheme

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| 1 (a) | A mixture of two or more metals (or Iron and Carbon) | (1 mark) | |
|-------|--|----------|---------|
| | e.g. Brass, Bronze, (Steel) etc | (1 mark) | |
| | | | 2 marks |

| | | | 2 marks |
|-------|-----------------------------------|----------|---------|
| | e.g. Oak, Elm, Ash etc | (1 mark) | |
| 1 (b) | From a tree that sheds its leaves | (1 mark) | |

| | | | 2 marks |
|-------|----------------------------------|----------|---------|
| . , | Between a set range | (1 mark) | |
| 2 (a) | An input that can have any value | (1 mark) | |

| | | | Max 2 marks |
|-------|---|-----------|----------------|
| | Description of a type of display, e.g. 7seg | (1 mark) | |
| 2 (b) | Displays the output in set increments OR | (2 marks) | |

| 3 | Electrical prime mover | (1 mark) | |
|---|----------------------------------|-----------|---------|
| | Conversion to rotary movement | (1 mark) | |
| | Conversion rotary to oscillatory | (2 marks) | |
| | | | 4 marks |

| 4 (a) | Resistance of LDR drops | (1 mark) | |
|-------|-------------------------------|----------|---------|
| | Voltage at junction rises | (1 mark) | |
| | Voltage greater than 1.6-1.8V | (1 mark) | |
| | TR1 & TR2 turn on | (1 mark) | |
| | Relay energises | (1 mark) | |
| | Motor stops | (1 mark) | |
| | | | 5 marks |
| | | | maximum |

| 4 (b) (i) | Limit current or protect transistors | (1 mark) | |
|------------|--------------------------------------|----------|---------|
| | | | 1 mark |
| | | | |
| 4 (b) (ii) | To adjust the potential divider | (1 mark) | |
| | To set the threshold level | (1 mark) | |
| | To calibrate the system | (1 mark) | |
| | | | 2 marks |
| | | | maximum |

| 5 (a) (i) | Clear definition | (2 marks) | |
|-----------|------------------|-----------|---------|
| | | | 2 marks |

| | | | 8 marks maximum |
|------------|---|-----------|--------------------|
| | Explanation of data analysis | (2 marks) | |
| | Suitable / accurate method of collecting data | (1 mark) | |
| | Identification of data to collect | (1 mark) | |
| | Appropriate magnitude of load | (1 mark) | |
| | Appropriate method of applying load | (1 mark) | |
| | Appropriate size of sample for test rig | (1 mark) | |
| i (a) (ii) | Suitable test for the property | (2 marks) | |

| 5 (b) (i) | Clear definition | (2 marks) | |
|-----------|------------------|-----------|---------|
| | | | 2 marks |

| 5 (b) (ii) | Suitable test for the property Appropriate size of sample for test rig Appropriate method of applying load Appropriate magnitude of load | (2 marks) (1 mark) (1 mark) (1 mark) | |
|------------|---|---|--------------------|
| | Identification of data to collect Suitable / accurate method of collecting data Explanation of data analysis | (1 mark) (1 mark) (2 marks) | |
| | | | 8 marks maximum |

| 6 (a) | Each relevant stage in a logical order | (1 mark) | |
|-------|--|----------|----------|
| | | | 10 marks |
| | | | maximum |

| | | | 10 marks |
|-------|---|-----------|----------|
| | No diagram – only description Max 8 marks | | |
| | Suitable inputs shown | (2 marks) | |
| | Suitable outputs shown | (2 marks) | |
| | Capable of producing time delays required | (2 marks) | |
| | Capable of producing correct sequence | (2 marks) | |
| 6 (b) | Suitable total system | (2 marks) | |

| | Quality of sketch and explanation | (2 marks) | 6 marks |
|-------|-----------------------------------|-----------|---------|
| | Suitable output | (1 mark) | |
| | Appropriately connected | (1 mark) | |
| | Appropriately placed | (1 mark) | |
| 7 (a) | Suitable sensor | (1 mark) | |

| | | | 8 marks maximum |
|-------|---------------------------------------|-----------|--------------------|
| | End of travel detection | (2 marks) | |
| | Guidance system for door | (2 marks) | |
| | Capable of opening and closing | (1 mark) | |
| | Capable of moving load involved | (1 mark) | |
| | Capable of slow movement | (1 mark) | |
| | Capable of producing length of travel | (1 mark) | |
| | Conversion to linear motion | (1 mark) | |
| 7 (b) | Suitable prime mover | (1 mark) | |

| | | (1.1.2.11) | 10 marks |
|-------|--|------------|----------|
| | Quality of diagram | (1 mark) | |
| | Explanation of the control sequence | (4 marks) | |
| | Connection to end of travel sensors | (2 marks) | |
| | Connection to person sensor | (1 mark) | |
| | mover | | |
| 7 (c) | Suitable control system capable of controlling prime | (2 marks) | |

| | | | 8 marks |
|-------|--|-----------|---------|
| | Mounting of systems | (2 marks) | |
| | Interconnections of sub-systems | (2 marks) | |
| | Quality of diagrams/communication | (4 marks) | |
| | Assembly of sub-systems: | | |
| | | | 4 marks |
| | Suitability of jointing/interconnections | (2 marks) | |
| | Suitability of materials | (2 marks) | |
| 7 (d) | Materials and construction: | | |

| | moves the door: Fixing of frame and prime mover Fixing to door | (2 marks) (2 marks) | 4 marks |
|-------|--|------------------------|---------|
| 7 (e) | Showing how the movement system is fitted and | | |