

Set 2 Mark Scheme – Sensors, Actuators & Controllers

Q	Expanded Answer Guidance	Marks
1a	<p>Any 3 sensors:</p> <ul style="list-style-type: none"> • Temperature (thermistor, thermocouple) • Proximity (inductive, capacitive) • Light (LDR, photodiode) • Pressure sensor • Humidity sensor • Ultrasonic sensor <p>Accept equivalents</p>	1
1b	<ul style="list-style-type: none"> • Identifies physical quantity (e.g. temperature, light, distance) • Explains what it detects • Gives valid application (e.g. thermostat, parking sensor) <p>Accept:</p> <ul style="list-style-type: none"> • Clear link between sensing and use • Real-world examples 	4
1c	<p>Analogue:</p> <ul style="list-style-type: none"> • Continuous signal • Range of values <p>Digital:</p> <ul style="list-style-type: none"> • Discrete values (0/1) • On/off behaviour <p>Accept:</p> <ul style="list-style-type: none"> • Examples (e.g. LDR vs switch) 	2
2a	<p>Actuator:</p> <ul style="list-style-type: none"> • Device that converts electrical signal into physical action <p>Role:</p> <ul style="list-style-type: none"> • Produces movement/output • Controlled by system/controller 	2

2b	<p>Linear:</p> <ul style="list-style-type: none"> • Straight-line motion <p>Rotational:</p> <ul style="list-style-type: none"> • Circular motion <p>Accept:</p> <ul style="list-style-type: none"> • Examples (e.g. piston vs motor) 	2
2c	<ul style="list-style-type: none"> • Names actuator (e.g. motor, solenoid) • Describes operation • Gives suitable application <p>Accept:</p> <ul style="list-style-type: none"> • Clear link between actuator and task 	4
2d	<p>Example:</p> <ul style="list-style-type: none"> • Sensor: proximity / optical • Actuator: motor / brake <p>Accept any valid pair</p>	1
2e	<p>Band 1 (1–2):</p> <ul style="list-style-type: none"> • Basic idea of control <p>Band 2 (3–4):</p> <ul style="list-style-type: none"> • Describes signal flow (sensor → controller → actuator) <p>Band 3 (5–6):</p> <ul style="list-style-type: none"> • Full system explanation including feedback/logic • Clear sequencing of operation 	6
3a	<p>Microcontroller:</p> <ul style="list-style-type: none"> • Small integrated system • Contains CPU, memory, I/O <p>Difference:</p> <ul style="list-style-type: none"> • Designed for specific tasks • Embedded use (not general-purpose) 	2
3b	<p>Microprocessor:</p> <ul style="list-style-type: none"> • CPU only • Requires external components <p>Accept:</p> <ul style="list-style-type: none"> • Comparison with microcontroller 	2

4a	<ul style="list-style-type: none">• Sensor: temperature sensor (thermistor)• Actuator: motor / linear actuator• Controller: Arduino / microcontroller <p>Accept equivalents</p>	2
4b	<ul style="list-style-type: none">• Reads temperature• Compares to threshold• If too hot → activates actuator• Opens window <p>Accept:</p> <ul style="list-style-type: none">• Logical sequence• Basic control flow	4