MODULE D DATA TRANSMISSION · D2

Serial, parallel and duplex: mark scheme

20 marks · Cambridge 0478 syllabus 2.1.2

How to use. One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. "..." means the point builds on the one before. Vague answers such as "it is faster" or "it is better" with no reason are not credited. Never credit a reversed answer (for example, saying serial data is skewed).

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) 0478 2.1.2(a)	(Data is sent) one bit at a time ... down a single wire / channel	**2**	One mark per bullet.
1(b) 0478 2.1.2(a)	Multiple / several bits are sent at the same time ... down multiple wires / channels	**2**	One mark per bullet.
2(a) 0478 2.1.2(a)	Sensor to monitoring computer: simplex Handheld radios: half-duplex Video call: full-duplex Both directions, one at a time: half-duplex	**4**	One mark per correct row. A row with more than one tick scores 0.
3(a) 0478 2.1.2(b)	Any three from: The data travels a long distance // 300 m is a long distance Bits arrive in order / in sequence // data will not be skewed Less interference // no crosstalk (between wires) More reliable / accurate over long distances Only one wire is needed, so the (long) cable is cheaper Sensor readings are a small amount of data, so the lower speed is not a problem	**3**	max 3. Answers must say why serial suits this link, not just describe serial.
3(b) 0478 2.1.2(b)	Any one from: Slower (than parallel) // takes longer to send data as only one bit is sent at a time	**1**	Do not accept "data can be skewed": skew is a parallel problem.
4(a) 0478 2.1.2(b)	Any two from: Short distance // the cable is only 30 cm ... so the bits are unlikely to be skewed // bits arrive together / in sync Multiple bits are sent at the same time, so it is faster Large amounts of data need to be sent quickly	**2**	max 2. "Faster" alone, with no reason, scores 0.

QUESTION	ANSWER	MARKS	GUIDANCE
4(b) 0478 2.1.2(b)	Any two from: Data needs to travel in both directions ... at the same time Print data can be sent while status data comes back // no waiting for the direction to switch	**2**	max 2.
4(c) 0478 2.1.2(b)	Any two from: Data can be skewed // bits may arrive out of order / at different times (over a long distance) More interference / crosstalk between the wires More wires are needed, so it is more expensive Only suitable for short distances // less reliable over long distances	**2**	max 2. Skew and "bits out of order" are the same point.
5(a) 0478 2.1.2(b)	Any one from: Cheaper // fewer wires / channels needed Simpler to set up	**1**	max 1.
5(b) 0478 2.1.2(b)	Any one from: Data can be sent in both directions at the same time No waiting for the other device to finish sending // no delay switching direction // faster overall	**1**	max 1. Do not accept "both directions" alone: half-duplex also does this.

Total: 20 marks