AQA Computer Science A-Level

3.9.1 Communication

Past Paper Mark Schemes

January 2010 Comp 2

8	(a)		Set of rules/agreed signals/agreed codes (for data exchange between systems) **R** instructions	1

January 2011 Comp 2

10	b		A set of (agreed) rules / codes / signals (for data exchange between systems); Agreed standard for communication between computer systems;	MAX 1

June 2011 Comp 3

10	**(a)**		Number of signal changes per second // rate at which signals can change; **A** voltage changes for signal changes as BOD	**1**
10	**(b)**	**(i)**	Each signal level/signal change represents two bits (of data)/more than one bit (of data) // channel supports four/more than two different signal levels/voltages // use of modulation/coding technique e.g. phase modulation **NE** Send more than one bit at a time **Must be clear that there are more than two signal levels**	**1**

June 2012 Comp 3

4	(a)		Greater the bandwidth, the higher the bit rate // positive correlation // (directly) proportional; Bandwidth must be at least 2wHz where w is the bit rate in bits per second;	MAX 1

4	(b)		Time delay between the moment something is initiated and the moment its effect begins **A** time delay between signal being transmitted and arriving **A** time taken for transmitted data to arrive at the receiver **A** lag for time delay **NE** delay in transmission, transmission time	1

4	(c)		Bit rate is double/twice baud rate // Baud rate is half bit rate; **A** "It" is double; **A** 2:1	1

June 2013 Comp 2

4	**(a)**		A set of rules/regulations (to allow communication between devices) // set of agreed signals/codes for data exchange; **NE** a rule // a regulation // a signal // a code **NE** instruction(s)	**1**

June 2017 AS Paper 2

08	1	**2 marks for AO1 (knowledge) and 2 marks for AO1 (understanding)** 1. Parallel communication requires more wires (and hardware); • Higher cost • More difficult to manage when setting up the system • More difficult to repeat/switch 2. Parallel communication needs the data to be kept synchronised across wires / risk of data skew over long distances; • More chance of errors • Limiting factor on transmission speed (as problem worsens at higher speeds) • Limiting factor on cable length 3. Parallel communication carries the risk of crosstalk between wires; • More chance of errors • Limiting factor on transmission speed (as problem worsens at higher speeds) **2 marks for AO1 (knowledge)** for making any two of points 1,2,3 above – 1 mark per point. **2 marks for AO1 (understanding)** for making any of the bulleted points above and linking the points to an associated knowledge point – 1 mark per point. Note that only 1 mark can be awarded for a particular understanding point (e.g more chance of errors) even if it is made more than once and connected to different knowledge points. **A.** points made in reverse, for example serial communication has less chance of errors because it uses fewer wires so cross talk does not occur.	**4**

08	2	**Marks are for AO1 (knowledge)** **1 mark for each term defined** [Bit rate] The number of bits that can be sent/received/transferred in one second/unit of time // the frequency at which bits can be transmitted/transferred; **R.** Unexplained examples [Latency] The delay between an action being instigated and its effect being noticed; **A.** time delay between signal being transmitted and arriving **A.** time taken for transmitted data to arrive at the receiver **A.** lag for time delay **NE.** delay in transmission, transmission time	**2**

June 2017 Paper 2

03	**1**	**Mark is for AO1 (understanding)**	**1**
		3;	
03	**2**	**Mark is for AO2 (apply)** 1500 (bits per second); **A.** 3 * 500 **A.** Value given in response to question part 3.1 multiplied by 500.	**1**

03	3	**Mark is for AO1 (understanding)** B; **R.** If more than one lozenge shaded.	1

03	4	**All marks AO1 (understanding)** Data skew might occur if parallel communication used; **A.** Eliminates risk of desynchronisation (between data signals) **A.** Bits transmitted simultaneously/together may arrive at different times **NE.** Bits will not arrive together The longer the distance the higher the likelihood of data skew; To avoid problems of cross-talk // interference between individual wires; Hardware (for serial communication) is cheaper to manufacture // cheaper cabling (for serial communication which is more important over long distances); **A.** "Easier" for "cheaper" **NE.** Just statement that fewer wires required without expansion eg lowering cost **NE.** References to data being corrupted without further explanation eg data skew, cross-talk **MAX 2**	2

June 2013 Comp 3

3	(a)		Serial send one bit at a time / after each other whereas parallel sends multiple bits simultaneously/at same time; **A.** "data" for "bits" in the context of parallel transmission Serial uses a single wire/cable/path/line whereas parallel uses several/multiple wires/cables/paths/lines; **R.** answers that refer to multiple channels achieved by sharing bandwidth *Both sides of point must be made.*	**2**

3	(b)		*Parity Bit:* 1; *Start bit, Stop Bit :* Can be either 0 or 1, but must both be different to get mark;	**2**

3	(c)		Receiver and transmitter (clocks) do not need to be/are not (exactly) synchronised // transmission of data without use of external clock signal // receiver and transmitter clock only synchronised at start of/for length of transmission // start bit used to synchronise clocks of sender and receiver // data sent as soon as available rather than waiting for clock pulse/synchronisation symbol; **NE** data sent as soon as possible without waiting for receiver to be ready // receiver does not know when data will arrive	**1**

Specimen AS Paper 2

04	**3**		**Marks are for AO1 (understanding)** In coffee shop speed could be limited for each device that is connected // throttling; In coffee shop more clients connecting to one access point; In coffee shop connection to Internet might have less bandwidth; In coffee shop there may be more collisions; **NOTE** accept answers made in terms of home **Max 2 marks**	MAX 2

Specimen Paper 2

02	**1**	**All marks AO1 (knowledge)** **1 mark:** Serial sends one bit at a time/after each other whereas parallel sends multiple bits simultaneously/at same time; **A.** "data" for "bits" in the context of parallel transmission **1 mark:** Serial uses a single wire/cable/path/line whereas parallel uses several/multiple wires/cables/paths/lines; **A.** serial requires fewer wires **R.** answers that refer to multiple channels achieved by sharing bandwidth **R.** unless both sides of a point are made.	2

02	**2**	**Mark is for AO1 (understanding)** Parallel communication can only be used over short distances // distance between computer and peripheral too great to use parallel communication // data skew might occur if parallel communication used; To avoid problems of cross-talk // interference between individual wires; Hardware (for serial communication) is cheaper to manufacture; **A.** fast transmission rate may not be required; **Max 1**	1

02	**3**	**Mark is for AO1 (knowledge)** Number of signal changes per second // rate at which signals can change; **A.** voltage changes for signal changes	1

02	**4**	**Mark is for AO1 (understanding)** Each signal level/signal change represents more than one bit (of data) // channel supports more than two different signal levels/voltages // use of modulation/coding technique eg phase modulation; **N.E.** Send more than one bit at a time **Must be clear that there are more than two signal levels**	1