Cambridge Assessment International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9618/01**

Paper 1 **For examination from 2021**

MARK SCHEME

Maximum Mark: 75

Specimen

This document has **12** pages. Blank pages are indicated.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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Question	Answer	Marks	Guidance
1(a)	1 mark per bullet • kibibyte is 1024 bytes while kilobyte is 1000 bytes • kibibyte has a binary prefix while kilobyte has a denary prefix	**1**	
1(b)	1 048 576 // 1024 * 1024 // $2^{10} * 2^{10}$	**1**	**The answer can be given as the calculation**
1(c)(i)	1 mark for answer, 1 mark for working (e.g. carries) 1 0 0 1 1 0 1 0 + 1 1 1 1 0 1 1 1 1 1 0 0 1 0 0 0 1 1 1 1 1 1 1	**2**	
1(c)(ii)	1 mark per bullet • overflow • the answer cannot be represented in the current number of bits	**2**	

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Question	Answer	Marks	Guidance
1(d)	1 mark for answer, 1 mark for working (e.g. borrowing/conversion to two's complement) 0 1 1 0 0 1 1 1 – 0 0 1 1 0 0 1 0 *Two's complement* 0 1 1 0 0 1 1 1 + 1 1 0 0 1 1 1 0 (1)0 0 1 1 0 1 0 1 1 1 1 1 *Borrowing* 0 10 10 0 ~~1~~ ~~1~~ ~~0~~ 0 1 1 1 – 0 0 1 1 0 0 1 0 0 0 1 1 0 1 0 1	**2**	

Question	Answer	Marks	Guidance
2(a)	1 mark per bullet • A set of 8 numbers • Each number is 4 hexadecimal digits • Separated by colons: • Valid example e.g. 12F3:2356:AB12:2015:0000:0000:1234:5123	**4**	**Allow valid examples such as** 12F3:2356:AB12:2015:: where :: designates 0 for remaining spaces

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Question	Answer	Marks	Guidance
2(b)	1 mark per bullet to max 2 for static, max 2 for dynamic Static: • When a computer disconnects and rejoins a network • ... the address does not change • Address is assigned by the server/ISP Dynamic: • Each time the computer rejoins a network • ... the address changes • address is assigned by the network OS	**4**	**Accept valid alternatives with the same meaning**
2(c)(i)	1 mark per bullet e.g. • Devices connected over a small geographical area • Uses dedicated infrastructure // company-owned infrastructure	**2**	
2(c)(ii)	1 mark per bullet to max 3 • Packet has address of recipient • Sender transmits packets directly to the server • Server reads address and identifies where recipient is • Server transmits packets directly to the recipient • Server transmits packets only to the recipient	**3**	
2(d)(i)	1 mark per bullet to max 3 e.g. • NIC // Network Interface Card • WNIC // Wireless Network Interface Card • WAP // Wireless Access Point • Hub • Switch • Router • Bridge • Repeater • Modem	**3**	**Do not award Cables, computers, servers they are in the question. Accept fibre-optic cables**

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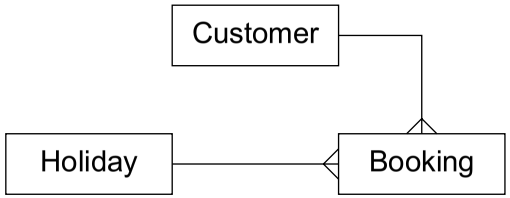
Question	Answer	Marks	Guidance
2(d)(ii)	1 mark per bullet to max 3 • Workstations 'listen' to the communication channel • If no data is being transmitted, the computer can send its data • Collision caused when 2 devices transmit at the same time • If a collision occurs, each workstation waits a random time • … before retransmitting • Each time a collision occurs, random time is increased	**3**	

Question	Answer	Marks	Guidance
3(a)(i)	1 mark per bullet • 3 suitable names • 1 Customer can have many Bookings • 1 Holiday can have many Bookings e.g.  	**3**	**0 marks for a many-to-many relationship between Customer and Holiday.** **Accept any recognised method of 1-to-many**
3(a)(ii)	1 mark for 3 appropriate Primary Keys 1 mark for None in Customer and Holiday 1 mark for two FKs in booking that match the PKs in Customer and Holiday **Table Name** / **Primary Key** / **Foreign Key** Customer / CustomerID / None Booking / BookingID / CustomerID, HolidayID Holiday / HolidayID / None	**3**	**Allow FT in names and structure**

Question	Answer	Marks	Guidance
3(a)(iii)	1 mark per bullet • No many-to-many relationships // only two 1-many relationships • All fields in each table are fully dependant on the PKs for each table	**2**	

3(b)(i)	1 mark per bullet
	• Selecting First name and Second name
	• From staff (and schedule)
	• Joining tables (inner join, or AND statement)
	• WHERE SCHEDULE.WorkDate = '22/5/2020'
	e.g.
	`SELECT STAFF.FirstName, STAFF.SecondName`
	`FROM STAFF, SCHEDULE`
	`WHERE SCHEDULE.WorkDate = '22/05/2020'`
	`AND SCHEDULE.StaffID = STAFF.StaffID;`
		4	

3(b)(ii)	1 mark per bullet
	• Selecting and using count on a field
	• From the table schedule
	• Where WorkDate = 26/5/2020 and Morning = TRUE
	e.g.
	`SELECT COUNT(StaffID)`
	`FROM SCHEDULE`
	`WHERE WorkDate = '26/05/2020' AND Morning = TRUE;`
		3	

Question	Answer	Marks	Guidance
4(a)	1 mark for each term The factory uses a **monitoring** system to record data such as the number of cakes being produced each hour. When the data collected from sensors are analysed and used as **feedback** it is a **control** system. One example of this system used in the factory is to maintain a constant temperature in the ovens. It uses a **temperature sensor** to measure the values.	**4**	**Allow alternative terms that have the same meaning**

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Question	Answer	Marks	Guidance
4(b)	1 mark per bullet to max 5 • When the infra-red/pressure sensor detects the tin is in the correct place • A message is sent to the microprocessor which • … sends a signal to an actuator to stop the conveyor belt • ... and sends a signal to another actuator to release the cake mixture • A pressure sensor continuously records the weight of the cake mixture in the tin • ... and sends the readings to the microprocessor • The microprocessor compares the readings with a pre-set value • When the weight of the cake mixture in the tin matches the desired weight • … the microprocessor sends a signal to the actuator to stop releasing the mixture • ... and sends a signal to another actuator to move the conveyer belt	**5**	
4(c)(i)	1 mark per bullet to max 4 e.g. • Can access private/confidential data • … can sell the recipes • … company can lose money • Can access the commands for the machines • … can stop the machines working • … can change what the machines are supposed to do • … can lose the company money	**4**	**Allow any reasonable implication**
4(c)(ii)	1 mark per bullet to max 4 e.g. • Install and run Firewall • … blocks signals that do not meet requirements • … keep up-to-date • Strong passwords • … more challenging to guess/work out/break • … example of strong password requirements • Additional/other authentication required • … e.g. biometric	**4**	**Allow any valid security measure e.g. encryption**

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Question	Answer	Marks	Guidance
4(d)(i)	0 0 0 0 1 1 1 0	**1**	
4(d)(ii)	1 mark for opcode, 1 mark for operand AND #0	**2**	
4(d)(iii)	0 0 1 0 0 1 0 0	**1**	
4(d)(iv)	Division by 2	**1**	
4(e)	1 mark per bullet to max 3 e.g. • Machines can learn from past problems/mistakes • … they can adapt to stop the same problem occurring again • … they can learn to predict what might happen and raise an alert • Machines can learn how to work more efficiently • … when an action slows the system down, it can prevent this happening again • … when an action increases the speed of the system, it can repeat this when necessary to improve the efficiency	**3**	**Any appropriate implication of AI related to the scenario**

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Question	Answer	Marks	Guidance
5(a)	1 mark per bullet • A OR B OR C • NOT (A OR B OR C) • B AND C AND D • Final OR 	4	**Accept working alternatives**

Question	Answer	Marks	Guidance
5(b)	1 mark per pair of answers	**4**	

A	B	C	Working space	X
0	0	0		1
0	0	1		0
0	1	0		1
0	1	1		1
1	0	0		1
1	0	1		1
1	1	0		0
1	1	1		0