Cambridge International AS & A Level

COMPUTER SCIENCE **9618/12**

Paper 1 Theory Fundamentals **May/June 2021**

MARK SCHEME

Maximum Mark: 75

Published

This document consists of **10** printed pages.

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.
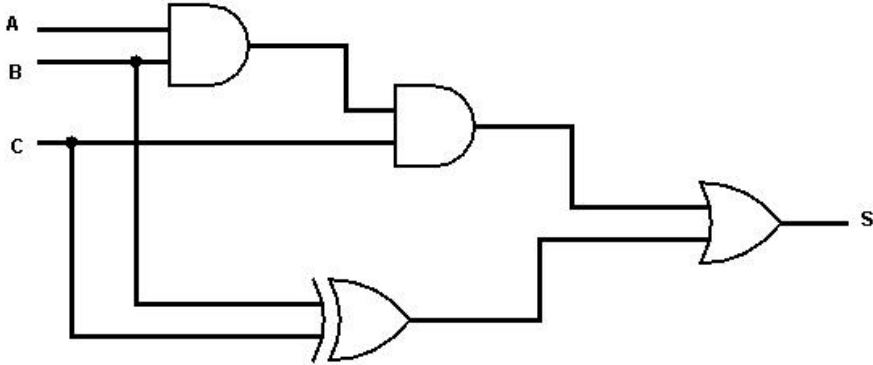

GENERIC MARKING PRINCIPLE 5:

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.

Question	Answer	Marks
1(a)	**1 mark** for definition, **1 mark** for appropriate example in each <table><tr><td>**Term**</td><td>**Definition and example**</td></tr><tr><td>**Field**</td><td>A column/attribute in a table e.g. CustomerID in the table CUSTOMER</td></tr><tr><td>**Entity**</td><td>Anything that data can be stored about e.g. A customer or a house</td></tr><tr><td>**Foreign Key**</td><td>A field in one table that is **linked** to a **Primary Key** in another table e.g. CustomerID / HouseID in table RENTAL</td></tr></table>	6
1(b)	**1 mark** per bullet point to **max 2** • All fields in all tables are dependant fully on the PK and on no other fields • for example all fields in Customer table are fully dependent on CustomerID	2

1(c)(i)	**1 mark** for each correctly completed line
	
	CREATE **TABLE RENTAL**(
	    RentalID INTEGER NOT NULL,
	    CustomerID INTEGER NOT NULL,
	    HouseID **VARCHAR** (5) NOT NULL,
	    MonthlyCost **REAL/CURRENCY** NOT NULL,
	    DepositPaid BOOLEAN NOT NULL,
	    PRIMARY KEY (RentalID)
	);
		4

1(c)(ii)	**1 mark** per bullet point • Select FirstName and LastName • From both tables • Where DepositPaid = No • Joining tables (either AND, or INNER JOIN) **Example script:** SELECT FirstName, LastName FROM CUSTOMER, RENTAL WHERE DepositPaid = No AND RENTAL.CustomerID = CUSTOMER.CustomerID;	4

Question	Answer	Marks
2(a)	**1 mark** per bullet point to **max 2** • To make sure the team members feel valued • To get the best work out of the team • To enable them to work well together • To enable them to create the best product for the client	2
2(b)	**1 mark** per bullet point to **max 3** • The rules / past moves / decision making algorithms of the game will be stored • The AI program is trained, by playing many times • AI will look (ahead) at possible moves • ... and/or analyse the pattern of past choices • … and choose the move most likely to be successful • Computer could learn how to improve // learn from previous mistakes • … by storing the positive/negative result of choices • ... and changing its future choices	3
2(c)	**1 mark** for each correct column	4

Statement	Free Software Foundation	Open Source Initiative	Shareware	Commercial Software
The user can edit the source code	✓	✓		
The user **must** always pay before being able to use the software				✓
The user can redistribute the software	✓	✓	✓	
The user always gets a trial period			✓	

Question	Answer	Marks
3(a)	**1 mark** for each correct gate, with correct inputs	**4**
3(b)	**1 mark** for each half (shaded)	**2**

A	B	C	Working space	S
0	0	0		0
0	0	1		1
0	1	0		1
0	1	1		0
1	0	0		0
1	0	1		1
1	1	0		1
1	1	1		1

Question	Answer	Marks
4(a)	**1 mark** for each shaded section / bullet point	4

* Load 65 into ACC
* Load 100 into ACC, increment and store in 102
* Load 68 into ACC
* Load 101 into ACC, decrement and store in 102

Instruction address	ACC	Memory address		
		100	101	102
		68	65	100
70	65			
71				
72				
73				
74				
76	100			
77	101			
78				101
79				
70	68			
71				
72				
80	101			
81	100			
82				100
83				
(70)				

Question	Answer	Marks
4(b)(i)	102	1
4(b)(ii)	AND	1

Question	Answer	Marks
4(b)(iii)	**1 mark** for AND, **1 mark** for #15 AND #15	**2**

Question	Answer	Marks
5(a)	**1 mark** for each term correctly inserted The **control unit/bus** transmits the signals to coordinate events based on the pulses of the (**system) clock**. The **data bus** carries data to components, while the **address bus** carries the address where data is being written to or read from. The **arithmetic logic unit/ALU** performs mathematical operations and logical comparisons.	**5**
5(b)	**1 mark** per bullet point to **max 3** per factor. **max 4** overall. Number of cores: • Each core processes one <u>instruction</u> per clock pulse • More/multiple cores mean that **sequences of instructions** can be split between them • … and so more than one <u>instruction</u> is executed per clock pulse // more **sequences of instructions** can be run at the same time • **More** cores decreases the time taken to complete task Clock speed: • Each <u>instruction</u> is executed on a clock pulse // one F-E cycle is run on each clock pulse • ... so the clock speed dictates the number of <u>instructions</u> that can be run per second • The **faster** the clock speed the more <u>instructions</u> can be run per second	**4**
5(c)(i)	**1 mark** per bullet point to **max 2** • Cloud storage can be free (for small quantities) • No need for separate (high capacity) storage devices // saves storage on existing devices • Can access data from any computer **with internet access** • Most cloud data services will have in-built backup/disaster recovery • Security could be better • Can easily increase capacity • Data can be easily shared	**2**

Question	Answer	Marks
5(c)(ii)	**1 mark** per bullet point to **max 2**: • Can only access (the cloud) with internet access • Security may not be strong // no control over security • There may not be any backups // no control over backups • It can take a long time to **upload/download** the data • It can be more expensive in the long term • There could be a limit to the amount of storage unless paid for • There could be compatibility/access issues • There could be issues with the company offering cloud services	2
5(d)	**1 mark** for each correct line 	4

Question	Answer	Marks
6(a)	1 mark for each correct answer ASCII = 128 // 2^7 Extended ASCII = 256 // 2^8	2
6(b)	**1 mark** per bullet point to **max 2** • Each character has its own **unique** code • Each character in the word is **replaced** by its code • The codes are stored **in the order in the word**	2

Question	Answer	Marks
6(c)(i)	31	**1**
6(c)(ii)	53	**1**

Question	Answer	Marks
7(a)	**1 mark** per bullet point to **max 2** • Program libraries store pre-written functions and routines • The program library can be referenced/imported • the functions/routines can be called in her own program	**2**
7(b)(i)	**1 mark** per bullet point to **max 4; max 3** from each section Interpreter: • Use an interpreter while writing the program • … to test/debug the partially completed program • … because errors can be corrected and processing continue from where the execution stopped // errors can be corrected in real time // errors are identified one at a time Compiler: • Use the compiler after the program is complete • … to create an executable file • Use the compiler to repeatedly test the same (completed) section • … without having to re-interpret every time // compiler not needed at run-time	**4**
7(b)(ii)	**1 mark** per correct tool to **max 2** e.g. • Breakpoints • Single stepping • Report windows	**2**

Question	Answer	Marks
8(a)	**1 mark** per bullet point • Security protects data against loss • Privacy protects data against unauthorised access	**2**
8(b)	**1 mark** for a correct answer • Two factor authentication • Biometric passwords • Key Card Access • Firewall	**1**

Question	Answer	Marks
8(c)	**1 mark** per correct answer to **max 2** • Malware // viruses // spyware // by example • Hacking • Phishing • Pharming	**2**