Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7000445196

COMPUTER SCIENCE **9608/11**

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

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **20** pages. Any blank pages are indicated.

[Turn over

1 Draw **one** line from each software licence to its correct description.

Software licence	Description
Shareware	A limited version of the software could be released and downloaded by anyone, but users would need to pay to unlock additional features.
Open Source	A licence **must** be purchased to use the software.
Commercial	Users **cannot** download the software over the Internet.
	The original source code is made available for other developers who can then modify and improve the software.

[3]

2 Zak designs a logo for his company. He uses vector graphics software to create the logo.

(a) One of the drawing objects in the logo is a circle.

Identify **four** properties of the circle.

1 .....

2 .....

3 .....

4 .....

[4]

(b) Describe what is meant by a **drawing list** using the logo as an example.

.....

.....

.....

..... [2]

(c) Zak could have used a bitmapped image for the logo.

Describe **two** drawbacks of using a bitmapped image for the logo instead of a vector graphic.

Drawback 1 .....

.....

.....

.....

Drawback 2 .....

.....

.....

.....

[4]

(d) Zak's company holds details about clients in a database.

Give **three** security measures that Zak can implement to make sure that only authorised employees can access the data.

1 .....

2 .....

3 .....

[3]

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3 The table shows part of the instruction set for a processor. The processor has one general purpose register, the Accumulator (ACC), and an Index Register (IX).

Instruction		Explanation
Op code	**Operand**	
LDD	<address>	Direct addressing. Load the content of the location at the given address to ACC.
LDI	<address>	Indirect addressing. The address to be used is at the given address. Load the contents of this second address to ACC.
DEC	<register>	Subtract 1 from the contents of the register (ACC or IX).
CMP	<address>	Compare the contents of ACC with the contents of <address>.
JMP	<address>	Jump to the given address.
JPE	<address>	Following a compare instruction, jump to <address> if the compare was True.
STO	<address>	Store the contents of ACC at the given address.
END		Return control to the operating system.

The current contents of the main memory are:

Address	Instruction
100	LDD 200
101	CMP 201
102	JPE 106
103	DEC ACC
104	STO 200
105	JMP 101
106	END
...	
200	2
201	0
202	200

(a) Trace the program currently in memory using the following trace table.

Instruction address	ACC	Memory address		
		200	201	202
		2	0	200

[3]

(b) The instruction in memory address `100` needs to be changed. It needs to use indirect addressing to load the contents of memory address `200`.

Give the new instruction to replace `LDD 200`.

..... [1]

(c) Each instruction in the assembly language program is encoded in 16 bits (8-bit op code followed by an 8-bit operand).

(i) The instruction `CMP 201` has the operand `201`.

Convert the operand `201` into 8-bit binary.

[1]

(ii) State the **maximum** number of op codes that can be represented using eight bits.

..... [1]

(d) The status register contains condition flags.

Identify **three** condition flags that can be set in the status register.

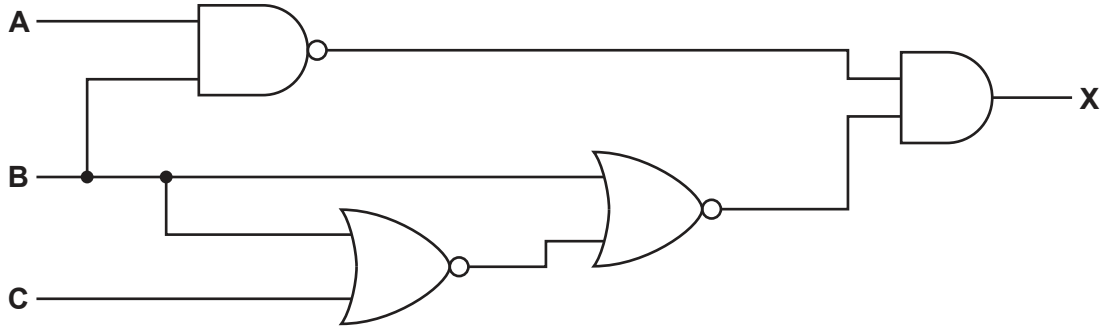
1 .....

2 .....

3 .....

[3]

4 Consider the following logic circuit:



(a) Complete the truth table for the logic circuit.

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

[4]

(b) Identify **three** logic gates **not** used in the logic circuit.

Gate 1 .....

Gate 2 .....

Gate 3 .....

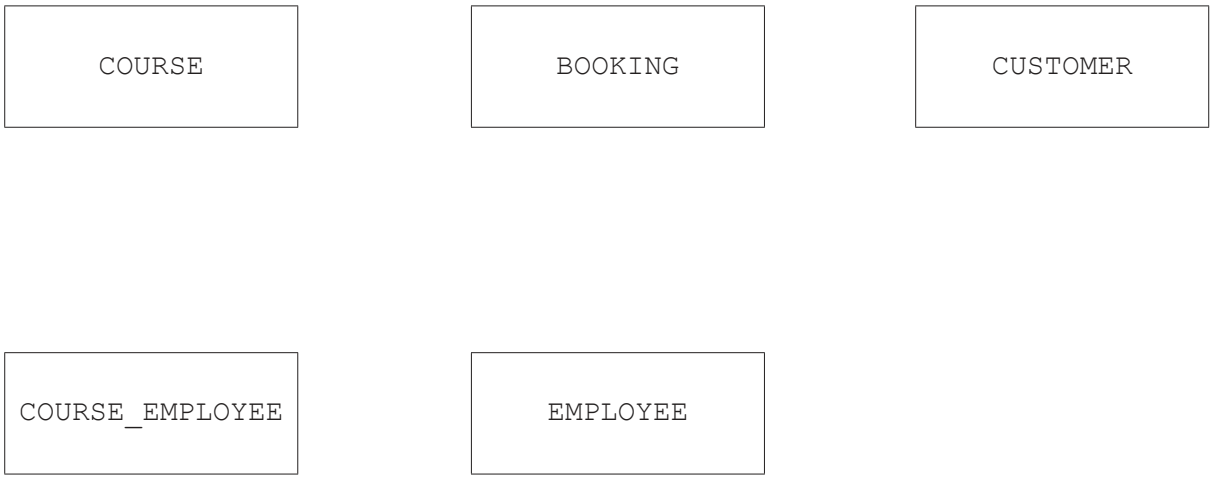
[1]

5 A company runs activity courses. It is creating a relational database to store details of the courses it runs.

The database has five tables:

```
EMPLOYEE(EmployeeID, FirstName, LastName, Role, Language)
BOOKING(BookingID, CustomerID, CourseID)
CUSTOMER(CustomerID, FirstName, LastName)
COURSE(CourseID, Title, Level, Date)
COURSE_EMPLOYEE(CourseID, EmployeeID)
```

(a) Complete the entity relationship (E-R) diagram for the database.



[4]

(b) Describe what is meant by **referential integrity**.
Give an example from the `CUSTOMER` and `BOOKING` tables in your answer.

.....

.....

.....

..... [2]

(c) A Data Definition Language (DDL) is used to create the structure of the database. One item that can be created is the database.

Identify **three other** items that can be created in the database using the DDL.

1 .....

2 .....

3.....

[3]

(d) Part of the `EMPLOYEE` table is shown.

EmployeeID	FirstName	LastName	Role	Language
001	Jasmine	Chen	Leader	French
002	Kenton	Archer	Leader	English
003	Michael	Roux	Cook	French
004	Conrad	Slavorski	Leader	Russian

Write a Data Manipulation Language (DML) statement to return the first name and last name of all employees, who are leaders, and speak either French or English.

.....

.....

.....

.....

.....

..... [4]

6 A web page includes HTML, JavaScript and PHP code.

```
<html>
<body>

<p>
<?PHP
    $message = "Enter the current time"
    echo $message
?>
</p>

24 hour clock hour<input id = "Time" value = "">
<button onclick = "timeOfDay()">Enter</button>

<script>
    function timeOfDay() {
        var hour, greeting;
        hour = document.getElementById("Time").value;
        if (hour < 18) {
            greeting = "Good day";
        } else {
            greeting = "Good evening";
        }
        alert(greeting);
    }
</script>

</body>
</html>
```

(a) The page is loaded and the value 16 is entered.

State the output when the enter button is clicked.

..... [1]

(b) Give the line number where the JavaScript function is called.

..... [1]

(c) Give the identifier names of **two** variables used in the JavaScript code.

1 .....

2 .....
[1]

(d) Tick (✓) **one** box in each row to indicate whether each of the following statements is true or false.

Statement	True	False
The program contains client-side and server-side code		
The PHP code in the program will run on the client-side		
Line `19` of the code outputs the message "`Good day`"		
Line `18` of the code contains a conditional statement		

[2]

(e) Examine the following list of terms:

bandwidth	**browser**	**compiler**	**HTML**	**interpreter**
JavaScript	**PHP**	**router**	**server**	**server-side**
transmission	**validation**			

Complete the following sentences by filling in the missing terms from the list.
Some terms may be used more than once. Some terms are not used.

..... can be performed both client-side and server-side.

It is performed more rapidly by the ..... because there is no delay in transmitting and receiving data to and from the ..... .

It is also performed on the server-side, because the client's ..... may not support ..... , so the data will still need checking to avoid errors.

[5]

7 This question presents three scenarios.

Tick (✓) **one** box for each scenario to indicate whether you think the behaviour shown is ethical or unethical. Justify your choice.

(a) Marina has a very short deadline to create a piece of software for a client. Algorithm A is quick to code and simpler to test but has an inefficient run time. Algorithm B is more complex to code and test but has a more efficient run time. She decides to implement algorithm A.

Ethical	
Unethical	

Justification .....

.....

.....

.....

..... [2]

(b) Doug is managing a project for a client that has fallen behind schedule. He asks all members of the project team to work extra hours and to cancel any holiday plans to get the project back on schedule.

Ethical	
Unethical	

Justification .....

.....

.....

.....

..... [2]

(c) Debbie is programming a car safety management system. She thinks that the test plan she has been given is not adequate. She decides to discuss her concerns on a public internet forum.

Ethical	
Unethical	

Justification .....

.....

.....

.....

..... [2]

8 Jay is developing a computer game that allows users to create stories.

(a) Jay uses a language translator to develop the computer game.

(i) Tick (✓) **one or more** boxes in each row to identify the language translator(s) each statement describes.

Statement	Assembler	Interpreter	Compiler
Translates and executes each line of source code one line at a time			
Translates low-level source code into machine code			
Must be present in memory to execute the code			
Translates high-level source code into low-level code			

[4]

(ii) Jay decides to use a compiler to develop the game.

Identify **two** benefits of using a compiler.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(b) The game generates a story which is stored as a text file.
Jay compresses the text file using lossless compression before sending it by email to his friend.

(i) Identify **two** reasons for compressing the text file.

1 .....

.....

2 .....

.....
[2]

(ii) Explain the reasons why Jay compresses the text file with lossless compression instead of lossy compression.

.....

.....

.....

..... [2]

9 **(a)** Identify **two** differences between a public IP address and a private IP address.

1 .....

.....

2 .....

.....

[2]

(b) Complete the table by identifying the **most appropriate** term for each description. Each term must be different.

Description	Term
Receives data packets from a network and forwards them onto a similar network	
Manages access to a centralised resource	
Joins networks that use different sets of rules to transmit data	
Monitors and controls incoming and outgoing network traffic based on set criteria	

[4]

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