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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7736503583

COMPUTER SCIENCE **9618/11**

Paper 1 Theory Fundamentals **October/November 2024**

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 **16** pages. Any blank pages are indicated.

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[Turn over

1 **(a)** State **one** difference between a tebibyte and a gigabyte.

.....

..... [1]

(b) **(i)** Convert the unsigned binary integer into hexadecimal.

110001100111

Answer ..... [1]

(ii) Convert the two's complement binary number into denary.

100110010111

Answer ..... [1]

(iii) Convert the Binary Coded Decimal (BCD) into denary.

010101110011

Answer ..... [1]

(c) Subtract the denary number 23 from the two's complement binary number 01001010

Perform this calculation using binary subtraction.

Show your working.

Working .....

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Answer .....

[2]

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(d) State **one** reason why binary addition and subtraction can result in overflow.

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2 A shop repairs electronic devices, for example mobile phones and tablet computers. The shop owner stores the data about the repairs using a file-based approach.

(a) Give **one** limitation of using a file-based approach to store the data **and** explain how a relational database addresses this limitation.

Limitation .....

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Explanation .....

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[3]

(b) The shop owner creates a relational database called `FIXIT`.

The database stores data about the customers and the devices for repair.

Some devices need new parts that are ordered from suppliers.

The database `FIXIT` is designed to include the following tables:

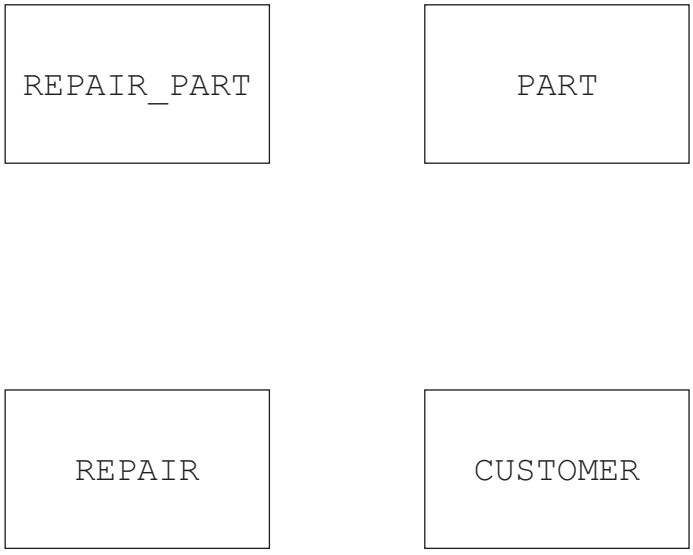
`PART(PartID, Description, Price, SupplierID)`

`CUSTOMER(CustomerID, FirstName, LastName, ContactNumber)`

`REPAIR(RepairNumber, StartDate, EndDate, CustomerID, Device)`

`REPAIR_PART(PartID, RepairNumber, Quantity)`

(i) Complete the entity-relationship (E-R) diagram for the given tables.



[3]

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(ii) The table shows sample data for the table `REPAIR_PART`.

PartID	RepairNumber	Quantity
ACD128SA	0022	3
PPOR543DWW	0022	1
TR453	0023	1
PPOR543DWW	0023	2
WED5	0024	5

Write a Structured Query Language (SQL) script to define the table `REPAIR_PART`.

Include constraints (restrictions) on the data that can be entered into each field where appropriate.

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(iii) Suppliers send invoices to the company for the parts that are used. A new table, `INVOICE`, stores the data about each invoice and whether it has been paid or not.

The design for the table `INVOICE` is shown:

`INVOICE(InvoiceID, SupplierID, AmountDue, Paid, DatePaid)`

The table shows sample data for the table `INVOICE`.

InvoiceID	SupplierID	AmountDue	Paid	DatePaid
000001	JK675	22.50	TRUE	01/01/2024
000002	WR443	358.99	FALSE	
000003	JK675	10.21	FALSE	

Write an SQL script to return the total amount due to the supplier with the ID of JK675 for all the invoices that have **not** currently been paid.

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(c) Complete the table by writing a definition for each of the database terms.

Term	Definition
Referential integrity	....
Candidate key	....
Tuple	....

[3]

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3 A computer system has a dual-core Central Processing Unit (CPU).

(a) State the purpose of the system clock and the Control Unit (CU) in a CPU.

System clock .....

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CU .....

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[2]

(b) (i) The number of cores in the processor affects the performance of the computer system.

Identify **one other** feature of a processor that can affect the performance of a computer system **and** state why it affects the performance.

Feature .....

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Reason .....

.....

[2]

(ii) A solid state (flash) memory drive is automatically recognised by the computer when it is plugged into a port in the computer.

Identify an appropriate type of port to connect the solid state memory drive to the computer.

Explain how this port provides an automatic connection.

Port .....

Explanation .....

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[3]

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(c) Identify **two** disadvantages of using Dynamic RAM (DRAM) instead of Static RAM (SRAM) in a computer system.

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[2]

(d) The computer system is used to store data received from a temperature sensor every five seconds. The data is stored on an optical disc using an optical disc reader/writer.

(i) Describe the principal operation of an optical disc reader/writer.

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(ii) The computer uses a buffer when writing data to the optical disc.

Explain the use of a buffer when writing data to the optical disc.

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4 A student uses a laptop to write a program that is saved as a text file.

(a) The laptop has utility software and an Operating System (OS).

(i) Describe the file management tasks carried out by an OS.

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..... [2]

(ii) Explain the need for back-up software.

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..... [2]

(b) The student compresses the file before it is emailed to their teacher as an attachment.

(i) Explain the benefits to the teacher of the attachment being a compressed file.

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(ii) Describe **one** lossless method of compressing a text file.

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(c) The student used a program library when writing their program.

Explain the benefits to the student of using library files when writing a program.

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(d) The program code is written using an Integrated Development Environment (IDE).

(i) One presentation feature found in a typical IDE is prettyprint.

Identify **and** describe **one other** presentation feature found in a typical IDE.

Feature .....

Description .....

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[2]

(ii) One debugging feature found in a typical IDE is single stepping.

Identify **and** describe **one other** debugging feature found in a typical IDE.

Feature .....

Description .....

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[2]

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5 A security system has both a floodlight (very bright light) and an audio alarm.

The data from multiple sensors is analysed and used to:

- turn on the floodlight
- sound the audio alarm.

Sensors can be used to detect:

- if doors are open
- the external daylight level
- if people are detected within a set distance.

(a) Complete the table to identify the most appropriate type of sensor for each scenario.

Scenario	Type of sensor
A door is open.	
The external daylight level is below a set amount.	
A person is detected within 2 metres.	

[1]

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(b) The floodlight (**X**) and audio alarm (**Y**) operate according to the following criteria:

Parameter	Description of parameter	Binary value	Condition
A	external daylight level	1	Low
		0	High
B	front door	1	Open
		0	Closed
C	person is within 2 m	1	Detected
		0	Not detected
D	back door	1	Open
		0	Closed
E	security system	1	Switched on
		0	Switched off

The floodlight turns on (**X = 1**) if:

- the security system is switched on
  and
- the external daylight level is low
  and
- a person is detected within 2 m.

The audio alarm turns on (**Y = 1**) if:

- the security system is switched on
  and
- one **or** more doors are open, **or** a person is detected within 2 m.

Write logic expressions for the security system.

X = ...

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Y = ...

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[2]

(c) Explain whether the security system is an example of a monitoring system or a control system.

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6 A car park system uses a camera to record the registration number of each car as it enters and leaves the car park.

Explain how artificial intelligence is used in the car park system to identify the car's registration number.

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..... [4]

7 Software is distributed with a licence.

(a) Give **two** benefits of distributing software using a shareware software licence.

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2 .....

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[2]

(b) Give **two** benefits of distributing software using a commercial software licence.

1 .....

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2 .....

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[2]

8 A computer designed using the Von Neumann model for a computer system contains general purpose registers and special purpose registers.

(a) Describe the purpose of the Status Register (SR).

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(b) Identify **two** differences between general purpose registers and special purpose registers.

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[2]

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