Cambridge Assessment International Education

CS BY AQIB KHAN

# Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*7938385792*

**COMPUTER SCIENCE** **9618/11**

Paper 1 Theory Fundamentals **May/June 2022**

**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.

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This document has **16** pages. Any blank pages are indicated.


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1 Computers store data in binary form.

**(a)** State the difference between a tebibyte and a terabyte.

.....

..... [1]

**(b)** Convert the signed denary value –100 into an 8-bit two's complement binary integer.

Working .....

.....

Answer ..... [1]

**(c)** Convert the denary number 251 into hexadecimal. Show your working.

Working .....

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.....

Answer ..... [2]

**(d)** Add the following unsigned binary integers.

```
  01010000
+ 00111110
```

[1]

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**2** A computer has hardware and software.

**(a)** The hardware includes different types of memory.

**(i)** Complete the description of computer memory.

Random Access Memory (RAM) and Read Only Memory (ROM) are both examples of

..... memory.

One item that is stored in RAM is ..... .

One item that is stored in ROM is ..... .

RAM can be either Static RAM (SRAM) or Dynamic RAM (DRAM).

SRAM uses transistors arranged as ..... .

DRAM uses transistors and ..... .

[5]

**(ii)** Explain the difference between Programmable ROM (PROM), Erasable Programmable ROM (EPROM) and Electrically Erasable Programmable ROM (EEPROM).

.....

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..... [3]

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**(b)** A magnetic hard disk is used to store data on the computer.

Describe the principal operations of a magnetic hard disk.

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..... [5]

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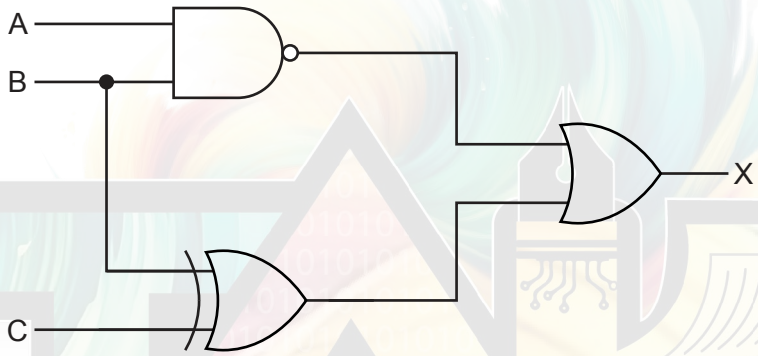
**(c)** Computers consist of logic gates.

**(i)** Complete the table by writing **one** set of values (input 1 and input 2) for each gate that will give the output 1.

| Gate | Input 1 | Input 2 | Output |
|---|---|---|---|
| AND | | | 1 |
| NAND | | | 1 |
| XOR | | | 1 |
| NOR | | | 1 |

[4]

**(ii)** Write the logic expression for the given logic circuit.




.....

.....

..... [3]

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3 A teacher is writing examination papers on a laptop computer. The computer is connected to the internet. The teacher is concerned about the security and privacy of the papers.

**(a)** State the difference between the security of data and the privacy of data.

.....

.....

..... [1]

**(b)** Identify **and** describe **two** threats to the data. Identify **one** security measure to protect against each threat. Each security measure must be different.

Threat 1 .....

Description .....

.....

Security measure .....

Threat 2 .....

Description .....

.....

Security measure .....

[6]

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**4** A teacher uses a relational database, MARKS, to store data about students and their test marks.

The database has the following structure:

STUDENT(StudentID, FirstName, LastName)

TEST(TestID, Description, TotalMarks)

STUDENT_TEST(StudentID, TestID, Mark)

**(a)** Describe the advantages of using a relational database compared to a file-based approach.

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..... [4]

**(b)** Give the highest level of Normal Form (NF) the database MARKS is in **and** justify your choice.

Normal Form .....

Justification .....

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.....

[3]

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**(c) (i)** Sample data to be stored in the table `STUDENT_TEST` is shown.

| StudentID | TestID | Mark |
|---|---|---|
| 12 | A1 | 50 |
| 12 | P10 | 100 |
| 13 | A1 | 75 |
| 14 | P10 | 60 |

Write a Structured Query Language (SQL) script to create the table `STUDENT_TEST`.

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..... [5]

**(ii)** Write a Structured Query Language (SQL) script to find the average mark of students in test A7.

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..... [3]

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**(d)** The mark a student is awarded in a test will be entered into the database. This mark needs to be a whole number between 0 and the maximum number of marks for that test (inclusive).

Explain how data validation **and** data verification can be used when a mark is entered.

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..... [4]

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**5** A programmer uses an Integrated Development Environment (IDE) to develop a program.

**(a)** Draw **one** line from each IDE feature to its correct description.

| IDE feature | Description |
|---|---|
| Context-sensitive prompt | Executes one line of the program and then stops |
| Dynamic syntax check | Underlines or highlights statements that do not meet the rules of the language |
| Breakpoint | Outputs the contents of variables and data structures |
| Single stepping | Stops the code executing at a set line |
| Report window | Displays predictions of the code being entered |

[4]

**(b)** The programmer wants to allow users to edit, improve and redistribute the program.

Identify **two** different types of software licence that the programmer could use.

1 .....

2 .....

[2]

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**(c)** Explain the benefits to the programmer of using program libraries.

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..... [3]

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6 **(a)** A computer system is designed using the basic Von Neumann model.

**(i)** Describe the role of the registers in the Fetch-Execute (F-E) cycle.

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..... [5]

**(ii)** Describe when interrupts are detected in the F-E cycle **and** how the interrupts are handled.

Detected .....

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Handled .....

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[5]

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**(b)** Identify **one** factor that can affect the performance of the computer system **and** state how it impacts the performance.

Factor .....

Impact .....

.....

.....
[2]

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**Question 6 continues on the next page.**

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**(c)** The table shows part of the instruction set for a processor. The processor has one general purpose register, the Accumulator (ACC).

| Instruction | | Explanation |
|---|---|---|
| **Opcode** | **Operand** | |
| `AND` | `#n` | Bitwise AND operation of the contents of ACC with the operand |
| `XOR` | `#n` | Bitwise XOR operation of the contents of ACC with the operand |
| `OR` | `#n` | Bitwise OR operation of the contents of ACC with the operand |
| `LSL` | `#n` | Bits in ACC are shifted logically n places to the left. Zeros are introduced on the right hand end |
| `LSR` | `#n` | Bits in ACC are shifted logically n places to the right. Zeros are introduced on the left hand end |
| # denotes a denary number, e.g. #123 | | |

**(i)** Complete the register to show the result **after** the instruction `AND #2` is executed.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Register before: | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Register after: | | | | | | | | |

[1]

**(ii)** Complete the register to show the result **after** the instruction `OR #8` is executed.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Register before: | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Register after: | | | | | | | | |

[1]

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**(iii)** Complete the register to show the result **after** the operation `LSL #4` is executed.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Register before: | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Register after: | | | | | | | | |

[1]

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