Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2099247366

COMPUTER SCIENCE **9618/11**

Paper 1 Theory Fundamentals **October/November 2025**

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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1 (a) (i) Convert the binary number into hexadecimal.

101100111010

..... [1]

(ii) Convert the denary number into Binary Coded Decimal (BCD).

108

..... [1]

(iii) Convert the 12-bit two's complement binary integer into denary.

Show your working.

111110111100

Working .....

.....

.....

.....

Denary value .....

[2]

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(b) (i) The following binary addition is performed using 8-bit registers.

Complete the calculation using binary addition.

```
  10110011
+ 01111000
```

[1]

(ii) Name and describe the error that can occur when binary addition is performed.

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.....

.....

..... [2]

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2 A relational database, WORKEXPERIENCE, stores data about students and the companies where they complete work experience.

Students can complete multiple work experience placements but can only complete one placement at a time.

Students can complete more than one placement at the same company.

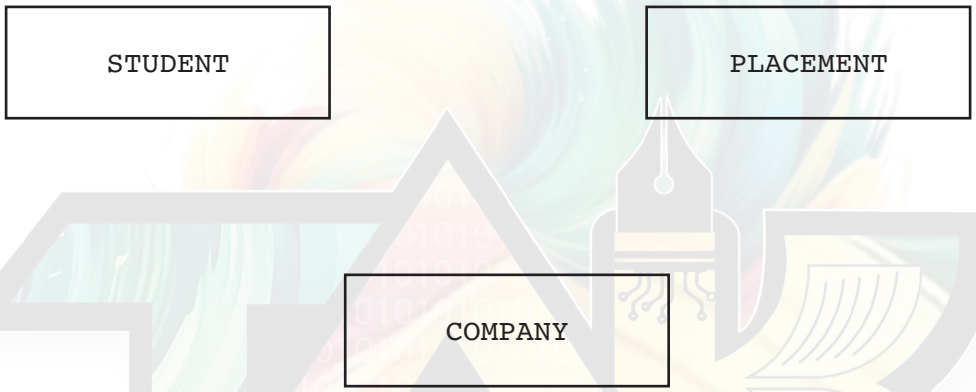
Part of the database is shown:

STUDENT(StudentID, FirstName, TelephoneNumber, UniversityName)

PLACEMENT(PlacementID, StudentID, CompanyID, StartDate, EndDate, Complete)

COMPANY(CompanyID, CompanyName, MaxStudentsPerPlacement)

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



[2]

(b) Explain why the database WORKEXPERIENCE is in Third Normal Form (3NF).

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..... [2]

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(c) Some example data from the `PLACEMENT` table is shown:

PlacementID	StudentID	CompanyID	StartDate	EndDate	Complete
PC001	LDEA01	MSCM	01/01/2023	12/07/2023	TRUE
PC002	LDEA01	MSCM	01/04/2024	08/05/2024	FALSE
PC003	ALAU02	NEAM	09/03/2020	10/03/2021	FALSE
PC004	LOLI75	GOUZ	07/06/2018	11/09/2018	TRUE

(i) Write a Structured Query Language (SQL) script to delete all placements that have been completed.

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..... [2]

(ii) Write an SQL script to return the total number of placements completed by the student with ID LDEA01 at the company with ID NEAM. The total should be given an appropriate name.

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..... [4]

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(d) The database tables are repeated here:

STUDENT(StudentID, FirstName, TelephoneNumber, UniversityName)

PLACEMENT(PlacementID, StudentID, CompanyID, StartDate, EndDate, Complete)

COMPANY(CompanyID, CompanyName, MaxStudentsPerPlacement)

Explain what is meant by referential integrity, and how it applies to this database.

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.....

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..... [3]

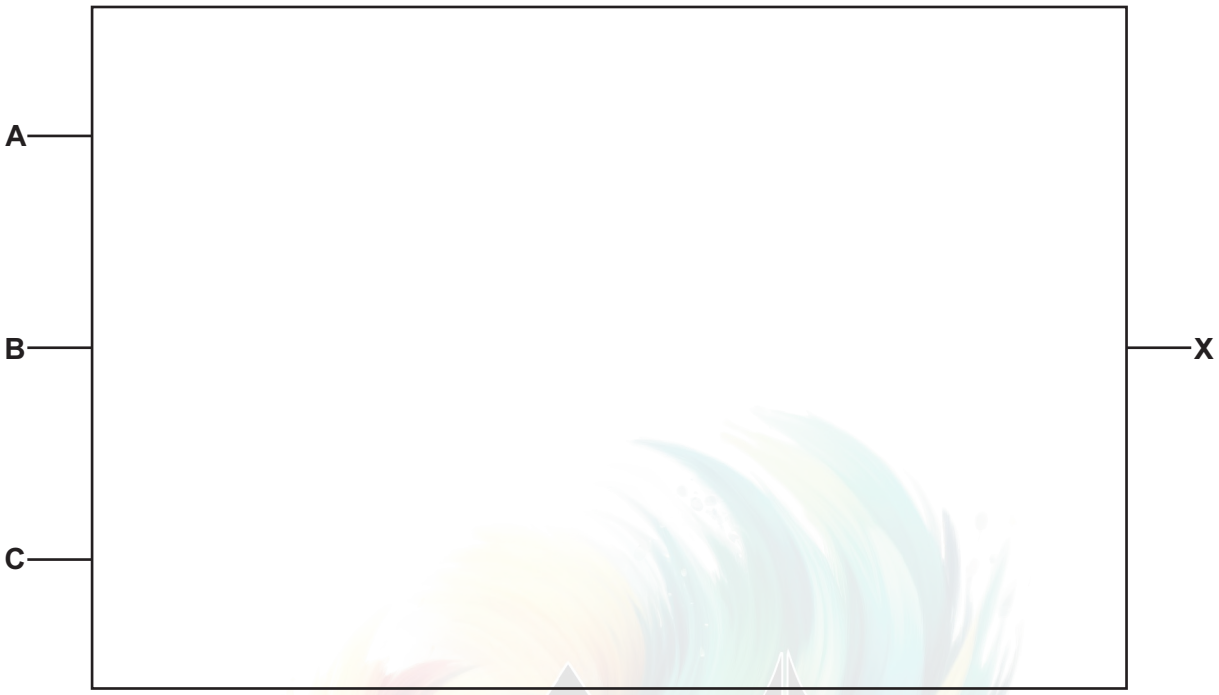
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3 **(a)** Draw a logic circuit for the logic expression:

X = NOT ((**A** NAND **B**) XOR (NOT **A** OR NOT **C**))



[2]

(b) Write the logic expression for the following truth table.

R	S	T	Q
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

Q = ... [2]

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

Instruction		Explanation
Opcode	**Operand**	
AND	#n / Bn / &n	Bitwise AND operation of the contents of the ACC with the operand
AND	<address>	Bitwise AND operation of the contents of the ACC with the contents of <address>
XOR	#n / Bn / &n	Bitwise XOR operation of the contents of the ACC with the operand
XOR	<address>	Bitwise XOR operation of the contents of the ACC with the contents of <address>
OR	#n / Bn / &n	Bitwise OR operation of the contents of the ACC with the operand
OR	<address>	Bitwise OR operation of the contents of the ACC with the contents of <address>
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.
<address> can be an absolute or symbolic address # denotes a denary number, e.g. #127 B denotes a binary number, e.g. B10010001 & denotes a hexadecimal number, e.g. &4A		

(a) The ACC currently contains the following positive binary integer:

0	0	0	1	1	1	1	0

Write a bit manipulation instruction that uses a binary shift to change the contents of the ACC to:

0	1	1	1	1	0	0	0

Instruction ..... [1]

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(b) The ACC currently contains the following positive binary integer:

1	1	1	0	0	0	1	1

Write the contents of the ACC after the instruction `XOR &12` is carried out.

[1]

(c) The ACC currently contains the following positive binary integer:

1	1	1	0	0	0	1	1

Write the contents of the ACC after the instruction `AND #63` is carried out.

[1]

(d) The ACC currently contains the following positive binary integer:

1	1	1	0	0	0	1	1

The current contents of memory are:

Address	Data
98	00100100
99	00110001
100	00110011
101	10100011
102	10101100

Write the contents of the ACC after the instruction `OR 100` is carried out.

[1]

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5 The Operating System (OS) is responsible for hardware and security management in a computer system.

(a) (i) State **two** tasks that are performed by hardware management.

1 .....

.....

2 .....

..... [2]

(ii) State **two** tasks that are performed by security management.

1 .....

.....

2 .....

..... [2]

(b) (i) Describe **one** benefit of using library routines when developing software.

.....

.....

.....

..... [2]

(ii) Describe **one** drawback of using library routines when developing software.

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..... [2]

(c) Identify **two** presentation features found in a typical Integrated Development Environment (IDE).

1 .....

2 .....

[2]

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6 **(a)** The processor uses several registers, including the Accumulator (ACC) and the Current Instruction Register (CIR).

Complete the table by describing the role of each register.

Register	Role
ACC	....
CIR	....

[2]

(b) Increasing the number of cores in a processor can affect the performance of a computer.

Describe the drawbacks of increasing the number of cores in a processor.

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.....

.....

..... [2]

(c) State **three** differences between Dynamic RAM (DRAM) and Static RAM (SRAM).

1 .....

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2 .....

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3 .....

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[3]

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7 Web browsers use Internet Protocol (IP) addresses.

(a) Complete the table by describing the following types of IP address.

Type of IP address	Description
Static	....
Public	....

[2]

(b) Consider the following IP address:

256.0.0.A

Circle whether this IP address is IPv4, IPv6 or an invalid IP address.

IPv4 IPv6 Invalid

Justify your choice.

.... [2]

(c) A user types a Uniform Resource Locator (URL) into the address bar of a web browser to access a web page.

Explain how the web browser uses the URL to access the web page.

.... [4]

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(d) A bitmap file is downloaded. The image has a maximum of 256 colours and measures 512 pixels wide by 2048 pixels high.

(i) Calculate an estimate of the file size of the bitmap in kibibytes.

Show your working.

Working .....

.....

.....

.....

File size of bitmap ..... kibibytes

[2]

(ii) Explain why the actual file size may be larger than the one calculated in **(d)(i)**.

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..... [2]

(iii) Explain how a bitmap image is compressed using run-length encoding (RLE).

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..... [2]

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8 One ethical consideration for a student connecting their personal computer to the school network is the risk of spreading malware on the network.

(a) Viruses and pharming are examples of malware.

Explain what is meant by a virus and pharming.

Virus .....

.....

.....

Pharming .....

.....

.....

[2]

(b) Give **three** other ethical considerations for a student using their personal computer to connect to the school network.

1 .....

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2 .....

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3 .....

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[3]

(c) Describe **two** social impacts of students using Artificial Intelligence (AI) to complete their homework.

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[4]

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9 Describe the differences between a monitoring system and a control system.

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..... [3]

10 An architect needs a model of a building.

(a) Explain how the model will be printed using a 3D printer.

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..... [3]

(b) State why a 3D printer needs a buffer.

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..... [1]

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