GradeMax

Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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1389778042

COMPUTER SCIENCE **9608/13**

Paper 1 Theory Fundamentals **May/June 2019**

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **14** printed pages and **2** blank pages.

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[Turn over

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1 A computer has an operating system (OS) and utility software.

(a) The following table lists key management tasks performed by an operating system and their descriptions.

Complete the table by writing the missing management task names and descriptions.

Management task	Description
Memory management	
	Provides user accounts and passwords
	Handles the signals sent when the attention of the processor is required elsewhere
Provision of a software platform	

[4]

(b) A hard disk formatter and a hard disk defragmenter are two examples of utility software.

(i) Describe the actions performed by a hard disk formatter and a hard disk defragmenter.

Hard disk formatter .....

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Hard disk defragmenter .....

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[4]

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(ii) Identify **three other** examples of utility software that can be installed on the computer.

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[3]

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2 Frankie is a software developer. He is developing a program to manage customer records for a client with an online retail business. He must ensure that data stored about each customer are both secure and private.

(a) State the difference between security and privacy.

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..... [2]

(b) Computer systems can be protected by physical methods such as locks.

Describe **two** non-physical methods used to improve the security of computer systems.

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[6]

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(c) A computer uses parity blocks to check the data that has been received is the same as the data that has been transmitted.

The following is an example of a parity block.

	Parity bit	Data						
	1	1	1	1	0	0	0	1
	0	0	0	0	1	1	1	0
	1	1	0	1	1	0	0	1
Parity byte	**1**	**1**	**0**	**1**	**1**	**0**	**0**	**1**

(i) Describe how a parity block check can identify a bit that has been corrupted during transmission.

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..... [4]

(ii) Give a situation where a parity block check **cannot** identify corrupted bits.

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..... [1]

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(d) One principle of the ACM/IEEE Software Engineering Code of Ethics is to always act in the best interest of the client.

Explain how Frankie can ensure that he is acting in the best interest of his client.

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(e) When the program is complete, Frankie uses a compiler to prepare the program for the client.

Explain why Frankie uses a compiler instead of an interpreter.

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..... [3]

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3 A company uses a relational database, `EMPLOYEES`, to store data about its employees and departments.

(a) The company uses a Database Management System (DBMS).

(i) The DBMS has a data dictionary.

Describe what the data dictionary stores.

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..... [2]

(ii) The DBMS has a query processor.

Describe the purpose of a query processor.

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..... [2]

(b) Relationships are created between tables using primary and foreign keys.

Describe the role of a primary and a foreign key in database relationships.

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..... [2]

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(c) In the company:

- An employee can be a manager.
- A department can have several managers and several employees.
- An employee can only belong to one department.

The EMPLOYEES database has three tables:

```
EMPLOYEE_DATA(EmployeeID, FirstName, LastName, DateOfBirth, Gender,
              DepartmentNumber)
DEPARTMENT(DepartmentNumber, DepartmentName)
DEPARTMENT_MANAGER(DepartmentNumber, EmployeeID, role)
```

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



[3]

(d) Give **three** reasons why the EMPLOYEES database is fully normalised.

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[3]

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(e) Part of the EMPLOYEE_DATA table is shown.

EmployeeID	FirstName	LastName	DateOfBirth	Gender	DepartmentNumber
156FJEK	Harvey	Kim	12/05/1984	Male	S1
558RRKL	Catriona	Moore	03/03/1978	Female	F2
388LMDV	Oscar	Ciao	01/01/1987	Male	F2

(i) Write a Data Definition Language (DDL) statement to create the EMPLOYEES database.

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..... [1]

(ii) Write a DDL statement to define the table EMPLOYEE_DATA, and declare EmployeeID as the primary key.

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(iii) Write a Data Manipulation Language (DML) statement to return the first name and last name of all female employees in the department named Finance.

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4 A program is written in assembly language.

(a) The op codes `LDM` and `LDD` are used to load a register. The op code `LDM` uses immediate addressing, and the op code `LDD` uses direct addressing.

Describe what happens when the following instructions are run.

```
LDM #300
```

.....

.....

```
LDD 300
```

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.....

[2]

(b) Assembly language instructions can be grouped by their purpose.

The following table shows four assembly language instructions.

Tick (✓) **one** box in each row to indicate the group each instruction belongs to.

Instruction	Description	Jump instruction	Arithmetic operation	Data movement
`LDR #3`	Load the number 3 to the Index Register			
`ADD #2`	Add 2 to the Accumulator			
`JPN 22`	Move to the instruction at address 22			
`DEC ACC`	Subtract 1 from the Accumulator			

[3]

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(c) The processor handles interrupts within the fetch-execute cycle.

(i) Give **one** example of a hardware interrupt and **one** example of a software interrupt.

Hardware .....

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Software .....

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[2]

(ii) Explain how the processor handles an interrupt.

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..... [5]

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5 Xander creates a presentation that includes images, video and sound.

(a) The images are bitmap images. A bitmap image can be made up of any number of colours. Each colour is represented by a unique binary number.

Draw **one** line from **each** box on the left, to the correct box on the right to identify the minimum number of bits needed to store each maximum number of colours.

Maximum number of colours	Minimum number of bits
68	1
256	2
127	3
2	7
249	8
	9

[3]

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(b) One of the videos has a frame rate of 40 fps (frames per second).

(i) State what is meant by **40 fps**.

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..... [1]

(ii) One video uses interlaced encoding, and a second video uses progressive encoding.

Describe **two** differences between interlaced and progressive encoding.

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2 .....

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[4]

(c) The sound track has a sampling rate of 88.2 kHz and a sampling resolution of 32 bits.

State what is meant by a **sampling rate of 88.2 kHz** and a **sampling resolution of 32 bits**.

Sampling rate of 88.2 kHz .....

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Sampling resolution of 32 bits .....

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[2]

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