CS BY AQIB KHAN

Cambridge International AS & A Level

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CENTRE NUMBER | CANDIDATE NUMBER

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.

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

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

tebibyte is a Binary prefix (2^{40}) where as gigabyte is a decimal prefix (10^9) Byte. [1]

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

110001100111

C 6 7

Answer C 67 [1]

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

100110010111

-2048 1024 512 256 128 64 32 16 8 4 2 1

1 0 0 1 1 0 0 1 0 1 1 1

-2048 + 256 + 128 + 16 + 4 + 2 + 1

256 128 16 4 2 1

407

2048 407 1641

Answer -1641 [1]

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

010101110011

5 7 3

Answer 573 [1]

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

2C

Perform this calculation using binary subtraction.

Show your working.

Working

128 64 32 16 8 4 2 1

23 → 0 0 0 1 0 1 1 1 → Binary (23)

1 1 1 0 1 0 0 1 → 2C

+ 0 1 0 0 1 0 1 0

0 0 1 1 0 0 1 1

Answer 00110011 [2]

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

When the number of Bit exceeds from the given registers so an overflow error occurs. [1]

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CHAP# 6

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 Data Redundancy

Explanation 1) Seperate tables are used.
2) Reduces data duplication.

[3]

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

CH-8

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

Some devices need new parts that are ordered from suppliers.

1.5 x

The database FIXIT is designed to include the following tables:

PART(PartID, Description, Price, SupplierID)

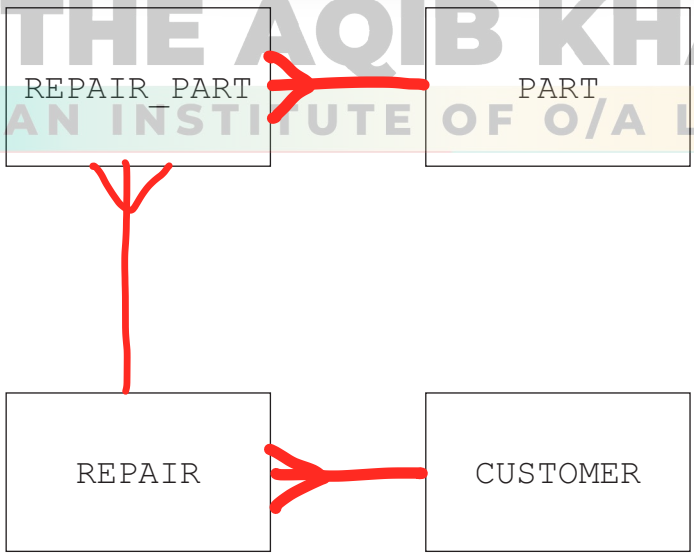
CUSTOMER(CustomerID, FirstName, LastName, ContactNumber)

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

REPAIR_PART(PartID, RepairNumber, Quantity)

PK, PK, PK, FK, FK, FK

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



[3]

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CH8 - SQL

(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

Composite Key

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.

```
CREATE TABLE REPAIR_PART(
PART_ID VARCHAR(20) NOT NULL,
REPAIR_NUMBER VARCHAR(4) NOT NULL,
QUATITY INTEGER NOT NULL,
PRIMARY KEY (PartID, REPAIR_NUMBER));
```

[5]

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CH-8

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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:

PK

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.

```
SELECT SUM(AmountDue)
FROM INVOICE
WHERE SupplierID = JK675
AND
Paid = FALSE
```

[3]

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

Term	Definition
Referential integrity	Reduces Data redundancy.
Candidate key	A potential primary key.
Tuple	Single entity in a table or row.

[3]

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CH3

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 ..... Synchronizes all the timing signals of all internal components. .....

CU ..... 1) Manages & control flow of data. 2) CU reads data & intrepret them & send to the appropriate component. .....

[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 ..... Clock Speed. .....

Reason ..... enhance the CPU performance. .....

[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 ..... USB .....

Explanation ..... - When Puged in a voltage diffesence is Created. .....

- The Process management detects the voltage diffesence and load appropriate drivers for the Puged Device. .....

[3]

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

1 DRAM Has a slower access speed than SRam

2 DRam needs constant refresh but SRam doesn't

[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.

1 - The optical disk is spinned at 7000 RPM's.

2 - Organic light is Projected on optical Disk.

3 - For Read the light is Reflected from the Disk and readed by the Photoelectric sensor the light reflects from Land and reads as (1) and doesnot reflects from Pit and Readed as (0)

- For write the disk goes under a process called, disk burn. [4]

(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.

- Buffer is a temporay memory.

- The data is sent to Buffer from high speed memory Ram to Buffer and then writed to slow speed memory from Buffer.

[3]

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CH5

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.

1- Creates path directory.
2- Specifies the logical method of file storage.
3- Allows searching for files.
4- Controls user access. [2]

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

- Allows data to be restored when lost.
- Automatically creates backs files. [2]

CH1

(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.

1- Less Bandwidth used during transfer.
2- Less Storage on Portal system.
3- Faster transmission Rate. [3]

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

1 - Run-Length encoding
2 - Count the number of Repeated characters and writes Run value as one character with its Count Run count. [3]

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CH-5

(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.

1- Tried and tested no chance of errors.

2- Reusibility can whenever needed.

3- Saves time as the code doesn't needs to be written multiple times.

[3]

(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 Auto Indentation

Description automatically indents the lines as the user enters or writes.

[2]

ERROR

(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 BReakPoint-

Description Runs the code to specific number of lines to check the value of variables.

[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.

CH-3
SENSOR

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.	INFRARED
The external daylight level is below a set amount.	Light Sensor
A person is detected within 2 metres.	Infrared Sensor

[1]

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CH3

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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 → E = 1
  and AND
- the external daylight level is low → A = 1
  and AND
- a person is detected within 2 m. → C = 1

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

- the security system is switched on → E = 1
  and AND
- one **or** more doors are open, **or** a person is detected within 2 m. → B or D or C

Write logic expressions for the security system.

X = E AND A AND C

Y = E AND B OR D OR C

[2]

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

- monitoring system
- there is no feedback loop
- The light and alarm has no effect to the input
- The system doesn't has any actuators.

[3]

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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.

- uses image recognation to find the pixels of each image are stored.
- uses OCR to Convert image into text and saves it in it's data Base.
- Compares the data to the data base to match the registration number.

[4]

7 Software is distributed with a licence. CH7

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

1 No Inital cost.

2 The devlopes can get feed back.

[2]

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

1 The Devlopes can earn money.

2 The software is well tested (no Bugs)

[2]

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CH3

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).

- Stores the value of flags.
- to allow flags to be checked

[2]

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

	GP	SP
1	Can be used for all purpose	Can be used for one task
2	used to store data during program operation	used to hold the state of program execution
examples	Accumulator	MAR, MDR, PC CIR etc.

[2]

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