GradeMax

Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0215246144

COMPUTER SCIENCE **9608/12**

Paper 1 Theory Fundamentals **May/June 2017**

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 **13** printed pages and **3** blank pages.

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1 Some shops belong to the Rainbow Retail buying group. They buy their goods from one or more suppliers.

Each shop has:

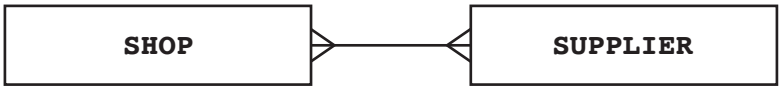
- a unique shop ID
- a single retail specialism (for example, food, electrical, garden).

Each supplier has:

- a unique supplier ID
- a similar single specialism recorded.

Rainbow Retail creates a relational database to record data about the shops and their suppliers.

The entity-relationship (E-R) diagram for the relationship between the `SHOP` and `SUPPLIER` tables is shown.



(a) Explain what the degree of relationship is between the entities `SHOP` and `SUPPLIER`.

.....

.....[1]

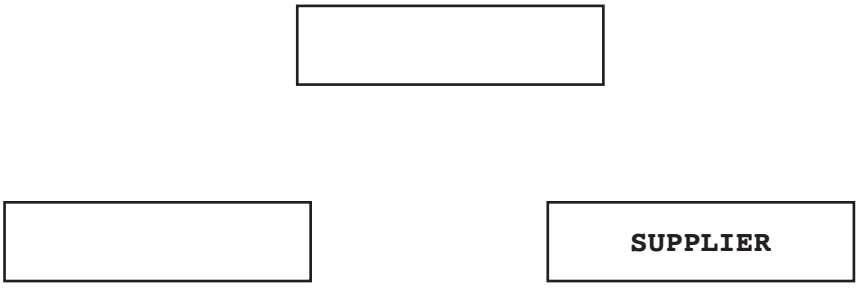
The database design is as follows:

```
SHOP(ShopID, ShopName, Location, RetailSpecialism)

SUPPLIER(SupplierID, SupplierName, ContactPerson, RetailSpecialism)

SHOP-SUPPLIER(ShopID, SupplierID)
```

The `SHOP-SUPPLIER` table stores the suppliers that each shop has previously used.

Primary keys are not shown.

(b) (i) Label the entities and draw the relationships to complete the revised E-R diagram.



[3]

(ii) Complete the following table to show for each database table:

- the primary key
- the foreign key(s) (if any):
  - Each table may contain none, one or more foreign key(s).
  - For a table with no foreign key, write 'None'.
- an explanation for the use of any foreign key.

Table	Primary key	Foreign key(s) (if any)	Explanation
`SHOP`			
`SUPPLIER`			
`SHOP-SUPPLIER`			

[5]

(iii) The database designer has implemented `SUPPLIER.ContactPerson` as a secondary key.

Describe the reason for this.

.....

.....

.....

.....[2]

(c) (i) Write an SQL query to display the shop ID and location of all shops with a 'GROCERY' specialism.

.....

.....

.....[3]

(ii) The existing shop with ID 8765 has just used the existing supplier SUP89 for the first time.

Write an SQL script to add this data to the database.

.....

.....

.....[3]

2 **(a)** The first column of the following table gives features of different types of printer.

Put a tick (✓) in the cells to show which features describe a laser and an inkjet printer.

	Type of printer	
	Laser	**Inkjet**
Impact printer		
Non-impact printer		
Line printer		
Page printer		

[2]

(b) Two of the components of an inkjet printer are a stepper motor and a print head.

Describe how each component is used when printing a page.

(i) Print head .....

.....

.....

.....

.....

.....

.....

.....

.....[5]

(ii) Stepper motor

.....

.....

.....[2]

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(c) A student has an old working laptop computer. It has a small capacity internal disk drive with almost all the storage space taken up by the operating system and application programs.

She needs to buy an external storage device to store her data files.

(i) List **two** suitable devices.

Device 1 .....

Device 2 .....
[2]

(ii) Describe **one** advantage of choosing one of the devices.

Advantage of choosing device 1 / 2 (*circle*)

.....

.....[1]

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3 **(a)** A computer has a microphone and captures a voice recording using sound editing software.

The user can select the sampling resolution before making a recording.

Define the term **sampling resolution**. Explain how the sampling resolution will affect the accuracy of the digitised sound.

Sampling resolution .....

.....

.....

Explanation .....

.....

[3]

(b) The computer also has bitmap software.

(i) Define the term **image resolution**.

.....

.....[1]

(ii) A picture is drawn and is saved as a 16-colour bitmap image.

State how many bits are used to encode the data for one pixel.

.....[1]

(iii) A second picture has width 8192 pixels and height 256 pixels. It is saved as a 256-colour bitmap.

Calculate the file size in kilobytes.

Show your working.

.....

.....

.....

.....

.....[3]

(iv) The actual bitmap file size will be larger than your calculated value as a bitmap file has a file header.

State **two** items of data that are stored in the file header.

1 .....

2 .....[2]

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4 **(a)** **(i)** Explain why a personal computer (PC) needs an operating system (OS).

.....

.....

.....[2]

(ii) One of the tasks carried out by the OS is the management of the use of the processor.

Name and describe **two** other management tasks that the OS performs.

1 .....

.....

.....

2 .....

.....

.....
[4]

(b) A user has the following issues with the use of their personal computer (PC).

For each case, state the utility software which should provide a solution.

(i) The user wants to send a large file as an attachment to an email. The user knows that the recipient's Internet Service Provider (ISP) has a limit of 2MB for file attachments.

Utility software solution: .....[1]

(ii) The user is writing a book and is worried that the document files could get damaged or deleted.

Utility software solution: .....[1]

(iii) The computer has recently been slow to load large files. The user has deleted a large number of small files to try to solve the problem. A friend has advised that there is a procedure which should be regularly carried out to reorganise file storage on the hard disk.

Utility software solution: .....[1]

(iv) The user clicked on an attachment in an unsolicited email. Since then, the computer has shown some unexplained behaviours.

Utility software solution: .....[1]

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[Turn over

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5 The following table shows part of the instruction set for a processor. The processor has one general purpose register, the Accumulator (ACC), and an Index Register (IX).

Instruction			Explanation
Op code (mnemonic)	**Operand**	**Op code (binary)**	
LDD	<address>	0001 0011	Direct addressing. Load the contents of the location at the given address to the Accumulator (ACC).
LDI	<address>	0001 0100	Indirect addressing. The address to be used is at the given address. Load the contents of this second address to ACC.
LDX	<address>	0001 0101	Indexed addressing. Form the address from <address> + the contents of the Index Register. Copy the contents of this calculated address to ACC.
LDM	#n	0001 0010	Immediate addressing. Load the denary number n to ACC.
LDR	#n	0001 0110	Immediate addressing. Load denary number n to the Index Register (IX).
STO	<address>	0000 0111	Store the contents of ACC at the given address.

The following diagram shows the contents of a section of main memory and the Index Register (IX).

(a) Show the contents of the Accumulator (ACC) after each instruction is executed.

IX

0	0	0	0	0	1	1	0

Address	Main memory contents
350	
351	86
352	
353	
354	
355	351
356	
357	22
358	

(i) LDD 355

ACC ..... [1]

(ii) LDM #355

ACC ..... [1]

(iii) LDX 351

ACC ..... [1]

(iv) LDI 355

ACC ..... [1]

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(b) Each machine code instruction is encoded as 16 bits (8-bit op code followed by an 8-bit operand).

Write the machine code for these instructions:

```
LDM #67
```


```
LDX #7
```


[3]

(c) Computer scientists often write binary representations in hexadecimal.

(i) Write the hexadecimal representation for the following instruction.

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

.....[2]

(ii) A second instruction has been written in hexadecimal as:

```
16 4D
```

Write the assembly language for this instruction with the operand in denary.

.....[2]

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6 Downloading a file from a website is an example of a client-server application.

(a) Describe what is meant by the term **client-server** for this application.

.....

.....

.....

.....[2]

(b) The following sequence of steps (1 to 5) describes what happens when someone uses their personal computer (PC) to request a web page. The web page consists of HTML tags and text content only. Four of the statements from **A**, **B**, **C**, **D**, **E** and **F** are used to complete the sequence.

A	Browser software interprets the script, renders the page and displays.
B	Browser software renders the page and displays.
C	Browser software compiles the script, renders the page and displays.
D	The web server retrieves the page.
E	The Domain Name Service (DNS) uses the domain name from the browser to look up the IP address of the web server.
F	The web server sends the web page content to the browser.

Write one of the letters A to F in the appropriate row to complete the sequence.

1. The user keys in the Uniform Resource Locator (URL) into the browser software.
2. .....
3. .....
4. .....
5. .....

[4]

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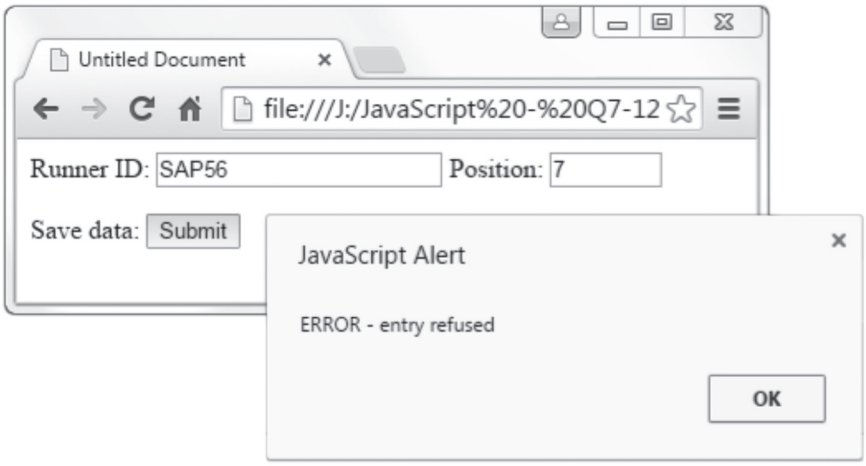
Question 6(c) begins on the next page.

(c) The following web page used for data capture consists of:

- two text boxes for the entry of:
  - a race runner's ID code
  - their finishing position in a race.
- a button that the user clicks to submit this runner's result.




```
 <html>
<head>
<title>Untitled Document</title>
<script language="JavaScript">

function myButton_onmousedown()
{
var Output1 = "Runner ID OK";
var Output2 = "ERROR - entry refused";

var Runner ID = document.forms["form1"]["txtRunnerID"].value;
//                                  || in Javascript is the 'OR' operator
if (RunnerID.substr(0,3) == "VAR" || RunnerID.substr(0,3) == "CAM")
{
          alert(Output1)
    }
    else
    {
          alert(Output2)
    }
}
</script>

</head>
<body>
<form name = form1>
  <label>Runner ID: </label>
  <input type="text" name="txtRunnerID" >
  <label>Position: </label>
  <input type="text" name="txtPosition" size = "5" >
  <p>
    <label>Save data: </label>
    <input type="button" name="btnSubmit" Value = "Submit"

    onMouseDown = "myButton_onmousedown()" >
  </p>
</form>

</body>
</html>
```

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(i) The developer has used three variables in the JavaScript code. State the identifiers used.

1. .....

2. .....

3. ..... [2]

(ii) The button has an event whose identifier is `onMouseDown`. When the mouse button is clicked, some code is run.

State the line numbers which contain this code.

From line ..... to line ..... [1]

(iii) The JavaScript code uses a selection statement.

State the line number which contains its condition.

Line number: ..... [1]

(iv) Describe the purpose of the validation check that the code performs.

.....

.....[1]

(v) Name and describe **two** other types of validation check which could be appropriate for this data capture form.

Validation check: .....

Description .....

.....

Validation check: .....

Description .....

.....
[4]

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