OCR
Oxford Cambridge and RSA

AS Level Computer Science
H046/01 Computing principles
Sample Question Paper

Date – Morning/Afternoon
Time allowed: 1 hour 15 minutes

Do not use:
- a calculator

First name									
Last name									
Centre number						**Candidate number**				

INSTRUCTIONS
- Use black ink.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **70**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **16** pages.

Answer **all** questions.

1 Intensive Care Units in hospitals are for patients in need of round the clock monitoring and support. Computerised systems can be used to monitor patients' vital signs (temperature, heart rate, blood pressure and breathing). They can then alert medical professionals to any significant changes.

These systems usually run on an embedded, real-time, operating system.

(a) (i) State what is meant by the term *real-time*.

……..……..

……..**[1]**

(ii) Explain why a real-time operating system would be suitable for this purpose.

……..……

……..…

……..**[2]**

(b) (i) Explain two advantages of this monitoring system having its operating system stored in ROM.

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……..**[2]**

(ii) The monitoring system also has RAM. Describe what happens to the contents of RAM and ROM when power to the monitoring system is removed.

……

……

……..**[2]**

(c)* The hospital would like to update the system so that it automatically delivers doses of certain drugs to patients based on the readings taken rather than leave delivery to medical staff.

Discuss the ethical benefits and drawbacks of this approach, explaining whether you would recommend making this update.

....**[9]**

2 InterMovie is a service that allows users to stream movies over the Internet.

(a) When users have played a movie it remains stored in a cache on the user's computer. This means that someone wanting to access the same film in future can stream it from other users rather than directly from the company's servers.

(i) State what this network model is called.

……**[1]**

(ii) Explain why the company might have opted for this model.

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……**[2]**

(b) InterMovie has a relational database of the films it offers. The database has the field *Film Title* which stores the name of a film (e.g. 'Aliens Attack').

(i) Describe why *Film Title* is not a suitable primary key.

……

……

……**[2]**

(ii) Describe why *Film Title* would make a suitable secondary key.

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……

……**[2]**

(c)* Discuss the legal issues the company might have considered in setting up this service and how it can ensure it complies with legal requirements.

.... **[9]**

3 The following assembly code in Fig.1 is written for the Little Man Computer instruction set.

```
      INP
      STA  arg1
      INP
      STA  arg2
      LDA  arg1
loop  SUB  arg2
      BRP  loop
      ADD  arg2
      OUT
arg1  DAT
arg2  DAT
```

Fig.1

(a) State the output when the inputs are 13 followed by 5.

.....**[1]**

(b) In the line:

```
loop  SUB   arg2
```

(i) State what opcode `SUB` does.

.....**[1]**

(ii) Name the register in which the result of this line is stored.

.....**[1]**

(c) (i) State what the program in Fig.1 does.

.....**[1]**

(ii) Using pseudocode write a program for a procedural language that takes in two inputs and gives the same output as the program in Fig.1.

……..

……..

……..

……**[2]**

4

(a) Convert the denary number 43 into an 8 bit binary number.

……

……**[1]**

(b) Using binary subtraction, calculate your answer to the following. You must show your working.

01001100 -
00110010

……

……

……**[2]**

(c) Using two's complement convert the denary number -43 into an 8 bit binary number. You must show your working.

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……**[2]**

(d) **(i)** Using normalised floating point binary representation using 4 bits for the mantissa and 4 for the exponent, represent the denary value 1.75. You must show your working.

……..

……

……**[2]**

(d) **(ii)** Using normalised floating point binary representation using 4 bits for the mantissa and 4 for the exponent, represent the denary value **-1.75**. You must show your working.

……..

……..

…… **[2]**

5 Burger House is a fast food restaurant which wants to encourage healthy eating amongst its younger diners.

(a) (i) Shown below in Fig.2 is the Burger House children's menu.

Children's Menu

Burgers

Cheeseburger

Grilled chicken burger *(Healthy Option)*

***

Side Dishes

French fries

Salad *(Healthy Option)*

Carrot Sticks *(Healthy Option)*

***

Desserts

Chocolate Brownie

Fruit Salad *(Healthy Option)*

Fig.2

Children receive a free toy when they select a meal (i.e. one burger, one side dish and one dessert) made up of only healthy options.

- Let *g* be a Boolean value for if a child has chosen a *grilled chicken burger.*
- Let *s* be a Boolean value for if a child has chosen *salad.*
- Let c be a Boolean value for if a child has chosen *carrot sticks.*
- Let *f* be a Boolean value for if a child has chosen *fruit salad.*
- Let *t* be a Boolean value for whether a child receives a toy.

Write an expression using Boolean algebra to determine whether a child receives a toy when they select a meal.

t =……

……

……**[3]**

(ii) Burger House wants to add this logic into its' till system.

Complete the code below assuming that g,s,c,f and t are Boolean variables with the same meaning as part **(i)**.

```
t=false

if _____________________________________then

    _____________

endif
```

[2]

6 An electronics engineer needs a circuit with the following logic.

$(A \wedge B) \vee (\neg A \wedge B) \vee (\neg C \wedge \neg D)$

Complete and use the Karnaugh map below to simplify the expression above.

CD \ AB	00	01	11	10
00				
01				
11				
10				

Simplified expression:

…… ……

……**[4]**

7 Laser Tag is a game where teams of players move round an arena shooting each other with infrared guns. Players wear sensors that keep track of how many times they have been hit by the laser. This is known as being 'tagged'.

Below is an extract from a Laser Tag company's website:

Reasons to Choose Us

Come play *Laser Tag* with us for:

- State of the art equipment
- Friendly staff
- Match recordings available to purchase
- Buy two games get one free.

The web page is written in HTML.

(a) Write some HTML code which could have been used to produce this extract. You can assume it is already inside `<body>` tags.

……..

……..

……..

……..

……**[4]**

(b) The website also includes JavaScript.

(i) Describe what is meant by the term *JavaScript*.

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……**[2]**

(ii) Explain why it is usually the case that JavaScript is interpreted rather than compiled.

……

……

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……**[2]**

(c) At the end of each match players upload their score to a computer. The computer stores the scores in the order they are received in a 2D array called `player`. The array stores the team as an integer (1 for green, 2 for red) and their score. An extract of the array called `player` is shown below. The first entry shows a green team member scored 45 points and the next shows a red team member scored 30 points.

1	45
2	30
2	46
1	31
1	10
1	32
2	2

Once all the players have uploaded their scores the computer adds up the scores for each team.

Using pseudocode write a program for a procedural language that works out and outputs the total score for each team. You may assume that there are always 20 players.

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……**[6]**

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