



COMPUTER SCIENCE HIGHER LEVEL PAPER 1

Friday 14 November 2008 (afternoon)

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer all the questions.
- Section B: answer all the questions.

SECTION A

Answer **all** the questions.

1.	Define the term <i>operating system</i> .	[2 marks]			
2.	Describe the role of the following in creating a computer program.				
	(a) An editor.	[2 marks]			
	(b) A compiler.	[2 marks]			
	(c) An interpreter.	[2 marks]			
3.	Outline the meaning of <i>buffering</i> .	[2 marks]			
4.	State two basic network topologies.				
5.	Describe how a binary search works.	[6 marks]			
6.	Describe, with the aid of a diagram, the data structure called a doubly linked list.				
7.	State two methods of collecting data.				
8.	Construct a labelled systems flowchart for the data processing described below. A sequential transaction file is sorted, stored onto a hard disk, and a printed report is produced.	[4 marks]			
9.	State the representation of the following values in an 8-bit register in two's complement form.	[+ marks]			
	(a) $+15_{(10)}$	[2 marks]			
	(b) $-15_{(10)}$	[2 marks]			

10. Convert 11110.01₍₂₎ to decimal.

[2 marks]

11. Outline the need for a *protocol* in data transmission across a network.

[2 marks]

12. Define the Boolean **XOR** operator by drawing the appropriate *truth table*.

[3 marks]

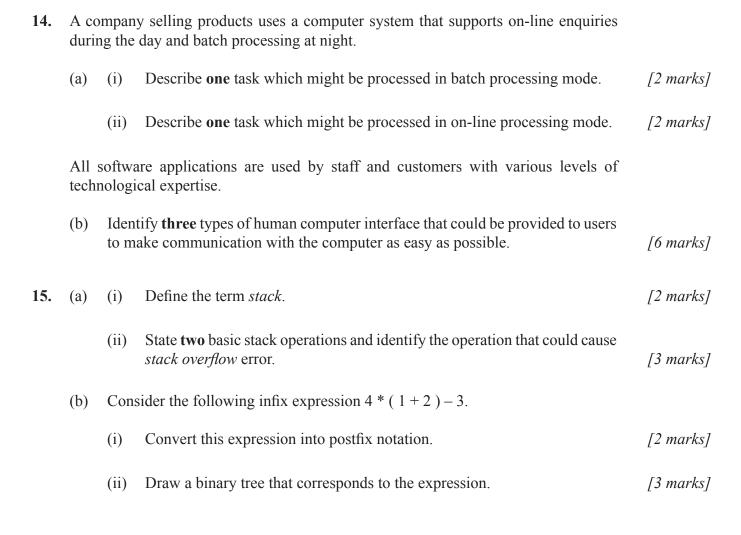
13. Outline **one** security application of digital cameras.

[2 marks]

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SECTION B

Answer all the questions.



16. (a) Define the term *file*.

[2 marks]

A sequential file is created. Each line contains the name of a student. For example:

− 5 **−**

Adams, J

Bush, M

Cash, L

Dove, J

The names are stored in alphabetical order.

(b) (i) Explain how the file could be updated when a new line is **inserted** in the file.

[3 marks]

(ii) Explain how a line could be **deleted** from the file.

[3 marks]

(c) Describe **one** advantage of *direct (random access) files* over *sequential files*.

[2 marks]

17. (a) (i) Define *CPU*.

[1 mark]

(ii) Explain the role of the program counter in the machine instruction cycle.

[2 marks]

(iii) Outline what is meant by the term bus.

[2 marks]

(b) (i) Create truth tables for the following two Boolean expressions.

$$x = \overline{A + \overline{B \cdot C}}$$

$$y = \overline{\overline{A \cdot B} + C}$$

[4 marks]

(ii) Hence determine whether they are equivalent.

[1 mark]

- **18.** An on-line information retrieval system holds confidential data.
 - (a) Outline **three** precautions which should be taken to minimize unauthorized access.

[3 marks]

(b) Explain why different users might be given different access privileges.

[3 marks]

(c) Explain how the data could be recovered after a systems failure.

[4 marks]

19. Consider the following two dimensional array.

A	0	1	2	3	4
0	1	1	1	1	0
1	0	0	1	1	2
2	2	2	2	0	1
3	1	1	1	1	1
4	4	3	2	1	1

(a) Construct a trace table for the following algorithm.

```
int sum = 0;
for (int k = 0; k < 5; k++)
{
    sum = sum + A[k][k];
}
output ("The sum is " + sum);
    [3 marks]</pre>
```

(b) (i) By tracing the following algorithm, or otherwise, show the output produced.

```
for (int j = 0; j < 5; j++)
{
  int sum = 0;
  for (int k = 0; k < 5; k++)
  {
    sum = sum + A[j][k];
  }
  output ("The sum is " + sum);
}</pre>
```

[5 marks]

(ii) Outline the purpose of the program fragment in part (b)(i).

[2 marks]