



88057011

**COMPUTER SCIENCE  
HIGHER LEVEL  
PAPER 1**

Friday 4 November 2005 (afternoon)

2 hours

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**INSTRUCTIONS TO CANDIDATES**

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

## SECTION A

Answer **all** the questions.

1. (a) State **two** differences between CD ROM and a *hard disk*. [2 marks]  
(b) State **two** appropriate uses for CD ROM. [2 marks]
2. Outline **one** reason that software development is normally cyclical. [2 marks]
3. Outline what is meant by *the scope of identifiers*. [2 marks]
4. Describe the function of a *linker*. [2 marks]
5. Describe how a *bubble sort* works. [3 marks]
6. Describe with aid of diagrams the data structure called *a doubly linked list*. [3 marks]
7. One of the *systems analyst's* tasks is to find facts about the current *computer system*. State **two** ways of collecting data about the current system. [2 marks]
8. (a) Define CPU. [2 marks]  
(b) Outline what is meant by the term *word size* of a computer. [2 marks]
9. Outline the representation of the following values in an 8-bit register in *two's complement* form.  
(a)  $+23_{10}$  [1 mark]  
(b)  $-23_{10}$  [1 mark]
10. Define *polling*. [2 marks]

11. Explain the purpose of 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** application of *digital cameras* in computing. [2 marks]
14. Outline the function of a *modem*. [2 marks]
15. Given the following *infix expression*  $5 \text{ div } 2 + 7 \text{ mod } 3$ :
- (a) Evaluate this expression. [1 mark]
- (b) Convert this expression into *postfix (RPN) form*. [2 marks]
- (c) Draw *the binary tree* representing this expression. [2 marks]

**SECTION B**

Answer **four** questions.

**16.** An organization established a single computer department to supply data processing services to all other departments. This centralized approach proved unsatisfactory and was replaced by *distributed processing*. In this system each department uses a separate computer facility to service its needs. Users have their own computer equipment and all computers are *networked*.

- (a) Suggest **three** reasons why the centralized approach might have proved unsatisfactory. [3 marks]
- (b) Discuss **two** benefits to users (employees, computer specialists, and management, *etc.*) from the distributed processing approach. [4 marks]
- (c) State **three** measures to maintain the *integrity* and *security* of data in this system. [3 marks]

17. (a) Define *file*. [2 marks]
- (b) Identify **two** factors to be considered when deciding which type of *file organization* is appropriate. [2 marks]
- (c) A file is to be stored on a *direct access device*.
- (i) State **two** methods by which the file on the *direct access device* may be organized. [2 marks]
- (ii) For **one** of the methods explain how a *record* in a file can be modified. [4 marks]

18. (a) Explain the main characteristics of
- (i) *batch processing*. [2 marks]
  - (ii) *real time processing*. [2 marks]
- (b) Identify the type of processing method that could be used
- (i) to control the position of a space shuttle. [1 mark]
  - (ii) for payroll processing. [1 mark]
- (c) Describe **one** advantage of using a *multitasking operating system* on a *single user system*. [2 marks]
- (d) Outline the difference between methods used to input data for *batch processing* and those used for *interactive processing*. [2 marks]

19. (a) Define *queue*. [2 marks]
- (b) Queues can be implemented either by *arrays* or *linked lists*.
- (i) Outline **one** problem that is likely to occur when an *array* is used to represent a *queue*. [2 marks]
- (ii) Explain the steps needed to add a node to the *queue* implemented by *linked list*. [3 marks]
- (c) (i) Explain what is meant by a *circular linked list*. [2 marks]
- (ii) Identify **one** reason to use a *circular linked list* to implement the queue rather than a *non-circular linked list*. [1 mark]

20. The array `NAMES` holds the following values.

Ana	Ena	Eva	Mia	Tea	Pia
[1]	[2]	[3]	[4]	[5]	[6]

In the following algorithm `SWAP` is a procedure that interchanges the values of two string variables.

```

procedure MYSTERY(val B1 integer,
                  val B2 integer,
                  ref NAMES string array [1..6])

    if B1 < B2
        then SWAP ( NAMES [B1], NAMES [B2])
              MYSTERY( B1+1, B2-1, NAMES)
        endif
    endprocedure MYSTERY

```

- (a) (i) Trace the algorithm for the call `MYSTERY(1, 6, NAMES)`. [4 marks]
- (ii) Deduce the purpose of the algorithm. [2 marks]
- (b) (i) Outline what is meant by *parameter passing*. [2 marks]
- (ii) Outline **one** advantage of using *parameter passing*. [2 marks]
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