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Computer science
Standard level
Paper 1

Monday 20 May 2019 (afternoon)

1 hour 30 minutes

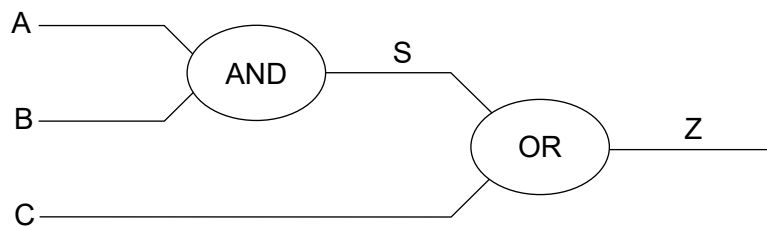
Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer all questions.
- The maximum mark for this examination paper is **[70 marks]**.

Section A

Answer **all** questions.

1. Define the term *peripheral*. [1]
2. Identify **two** features of a graphical user interface (GUI). [2]
3. Outline **one** method of collecting information from stakeholders concerning the requirements for a new system. [2]
4. Outline why a prototype would be used to demonstrate the proposed system to the client. [2]
5. State the hexadecimal equivalent of the following binary number:
11011111 [1]
6. Construct the truth table from the following logic circuit. [3]



7. Outline the purpose of the memory address register (MAR) in the central processing unit (CPU). [2]
8. State the part of the central processing unit (CPU) that is responsible for carrying out calculations. [1]
9. Compilers translate source code into object code. Identify **two** other operations performed by a compiler. [2]
10. Identify **two** ways that user documentation may be provided. [2]
11. Outline **one** reason why protocols are used in communications between computers. [2]
12. Identify **two** characteristics of a personal area network (PAN). [2]
13. Explain how data is transmitted by packet switching. [3]

Section B

Answer **all** questions.

14. A large mail order company is concerned about the security of its stored data.

- (a) Describe **two** possible causes of data loss. [4]
- (b) Outline **two** backup strategies that may be used to limit data loss. [4]

The company decides to improve its service by introducing a new user interface for its customers and has developed this interface to the point that it needs to be tested by users who are outside of the company.

- (c) Explain why beta testing is used to gather feedback for the new user interface. [3]
- (d) Outline **one** consequence of not involving end-users in the design and testing stages. [2]
- (e) Identify **two** features that could be used to improve the accessibility of the new user interface. [2]

15. A company that provides training for teachers plans to set up a training room in its offices with a network of 15 computers. Each computer has 1 TB of storage and 16 GB of random access memory (RAM).

- (a) Identify **two** characteristics of RAM. [2]
- (b) State the purpose of persistent storage on the computers. [1]

In order to minimize costs, the company decided only to install general application software on the training computers.

- (c) Identify **two** types of general application software that would be installed on the training computers. [2]

The company has decided to allow the teachers to use their own devices in its training room by adding wireless networking.

- (d) (i) Outline **one** advantage to the company of implementing this change. [2]
- (ii) Outline **one** disadvantage to the company of implementing this change. [2]
- (e) Describe **one** method of security that may be used on this wireless network. [2]
- (f) Explain why the speed of data transmission on the wireless network in the training room may vary. [4]

16. A school teacher decides to write a program to store class records and marks. Part of this program involves using a sort algorithm. The algorithm shown is a selection sort and to test it, the teacher has set up an array `VALUES[]` with 5 elements of test data.

```
LIMIT = 4

loop COUNTER1 from 0 to LIMIT - 1
MINIMUM = COUNTER1

  loop COUNTER2 from COUNTER1 + 1 to LIMIT
    if VALUES[COUNTER2] < VALUES[MINIMUM] then
      MINIMUM = COUNTER2
    end if
  end loop

  if MINIMUM ≠ COUNTER1 then
    TEMPORARY = VALUES[MINIMUM]
    VALUES[MINIMUM] = VALUES[COUNTER1]
    VALUES[COUNTER1] = TEMPORARY
  end if

end loop
```

(a) Identify **two** variables that have been used in the algorithm. [1]

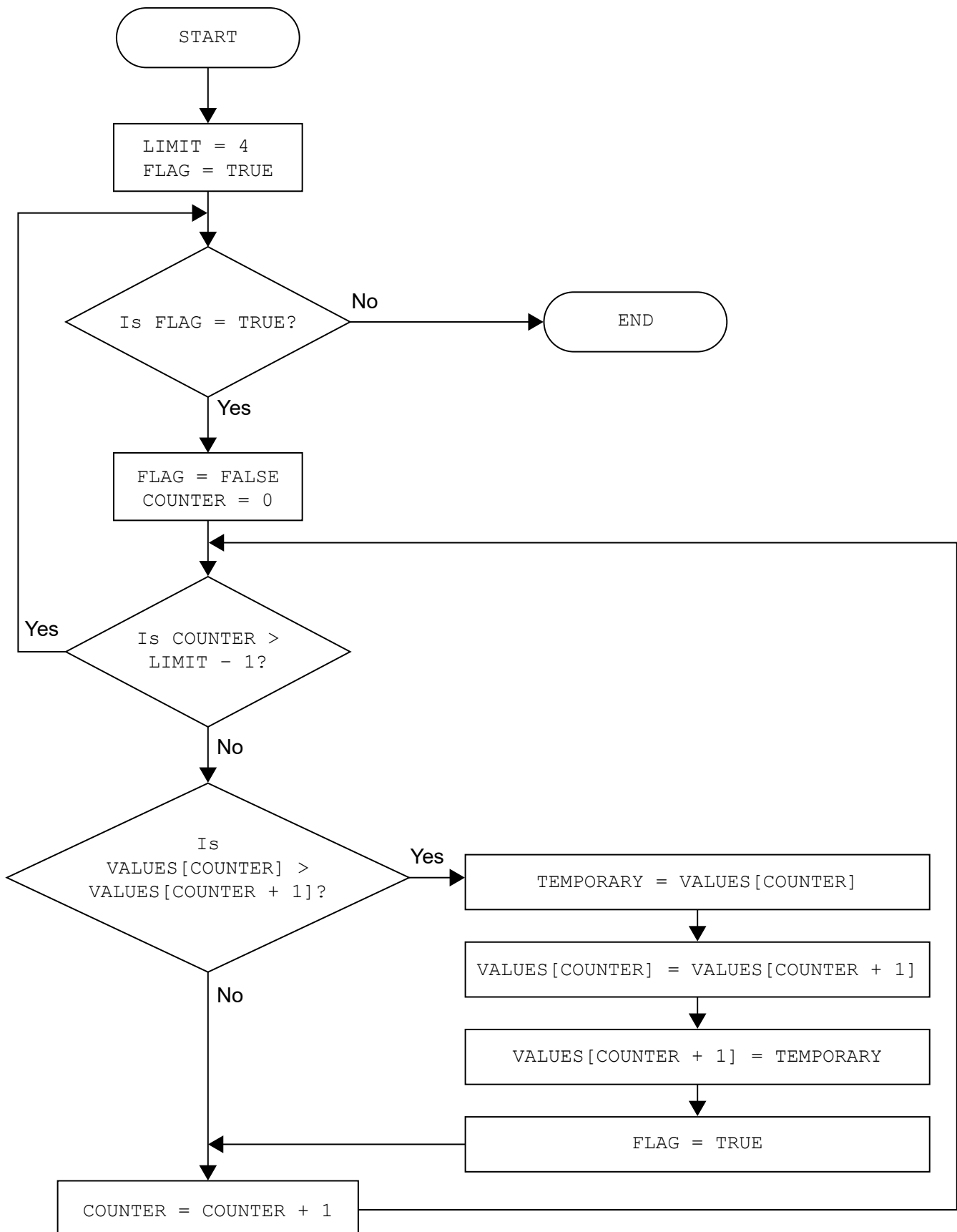
- (b) Copy and complete the table below to trace the algorithm using the data set:
20, 6, 38, 50, 40

| | | | Array VALUES[] | | | | | |
|----------|---------|----------|----------------|-----|-----|-----|-----|-----------|
| COUNTER1 | MINIMUM | COUNTER2 | [0] | [1] | [2] | [3] | [4] | TEMPORARY |
| 0 | 0 | 1 | 20 | 6 | 38 | 50 | 40 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[5]

(This question continues on the following page)

(Question 16 continued)



(This question continues on the following page)

Turn over

(Question 16 continued)

- (c) (i) With reference to the algorithm in the flow chart, construct this algorithm in pseudocode so that it performs the same function. [3]
- (ii) State the type of sort in the algorithm constructed in c(i). [1]
- (d) Construct an algorithm fragment to output the data in the array `VALUES []` [2]

The sorting algorithm could be part of a sub-program within a larger program.

- (e) Explain the benefits of using sub-programs when constructing a larger program. [3]
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