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General Certificate of Education
 Summer 2002
 Advanced Subsidiary Examination



COMPUTING

CPT1

Unit 1 Computer Systems, Programming and Networking Concepts

Thursday 30 May 2002 Afternoon Session

No additional materials are required.
 You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

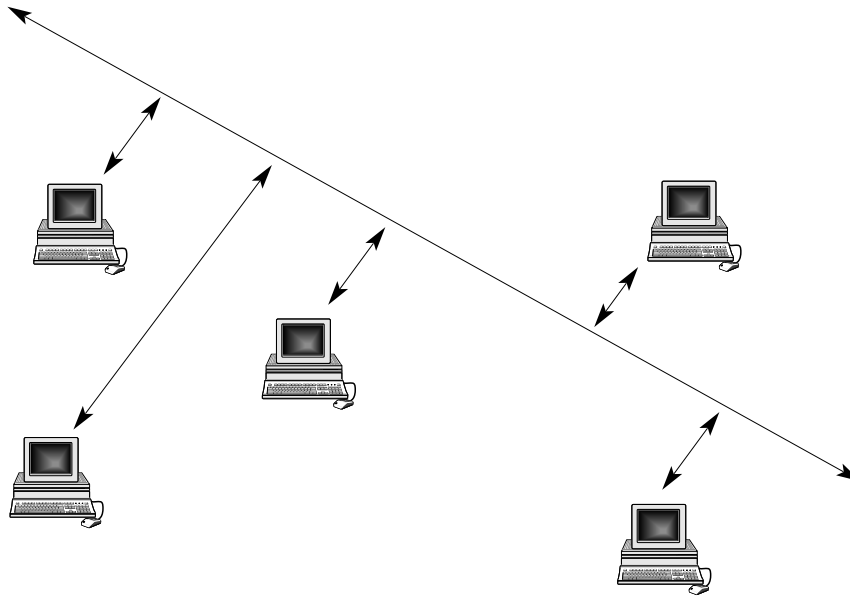
Information

- The maximum mark for this paper is 65.
- Mark allocations are shown in brackets.
- You will be assessed on your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate.
- The degree of legibility of your handwriting and the level of accuracy of your spelling, punctuation and grammar will also be taken into account.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
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10			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

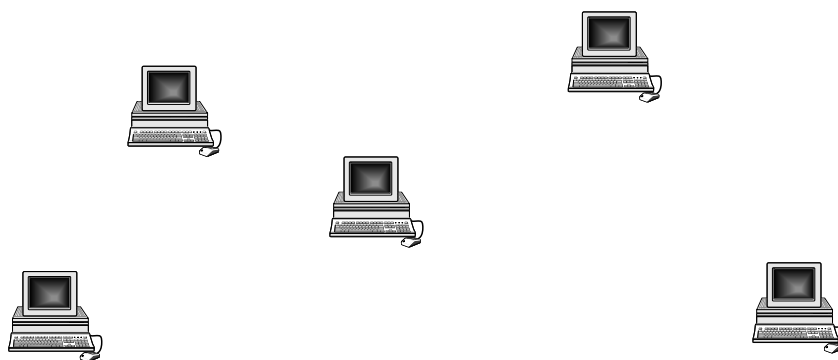
1 A small organisation has several computers in an office connected to form a network as shown below.



(a) What is the name of this network topology?
(1 mark)

(b) The network could instead be connected as a star topology.

(i) Draw the connections between the computers in a star topology in the diagram below.



(1 mark)

(ii) State **one** advantage of a star network compared with the network you have named in (a) above, and give a reason.

Advantage

Reason

.....

(2 marks)

- (c) The organisation would like to connect to the internet. The management has to decide whether to use *leased line networking* or *dial-up networking*.

What is meant by:

(i) leased line networking:

.....

(1 mark)

(ii) dial-up networking?

.....

(1 mark)

2 A computer system consists of both *hardware* and *software*.

(a) What is meant by:

(i) hardware:

.....

(1 mark)

(ii) software?

.....

(1 mark)

(b) One classification of software is *system software*.

(i) What is meant by system software?

.....

.....

(1 mark)

(ii) Give **one** example of system software.

.....

(1 mark)

(iii) Name **one** other software classification.

.....

(1 mark)

(iv) Give **one** example of this **type** of software. (Not a product name.)

.....

(1 mark)



Turn over ►

3 (a) Machine code is the first generation of programming languages. All other generations of programming languages need a program translator before the program can be executed. Name a type of translator suitable for:

(i) Second generation language programs:
(1 mark)

(ii) Third generation language programs:
(1 mark)

(b) Imperative *high level languages* are third generation.

Give **two** characteristics of high level languages that distinguish them from second generation languages.

1
2
(2 marks)

(c) In one high level language an example of a constant definition would be

```
CONST    VatRate = 17.5;
```

State **one** advantage of using a named constant, like `VatRate`, rather than the actual value (17.5) in a high level language program.

.....
.....
(1 mark)

(d) (i) Name an imperative high level language which you have studied.

.....
(1 mark)

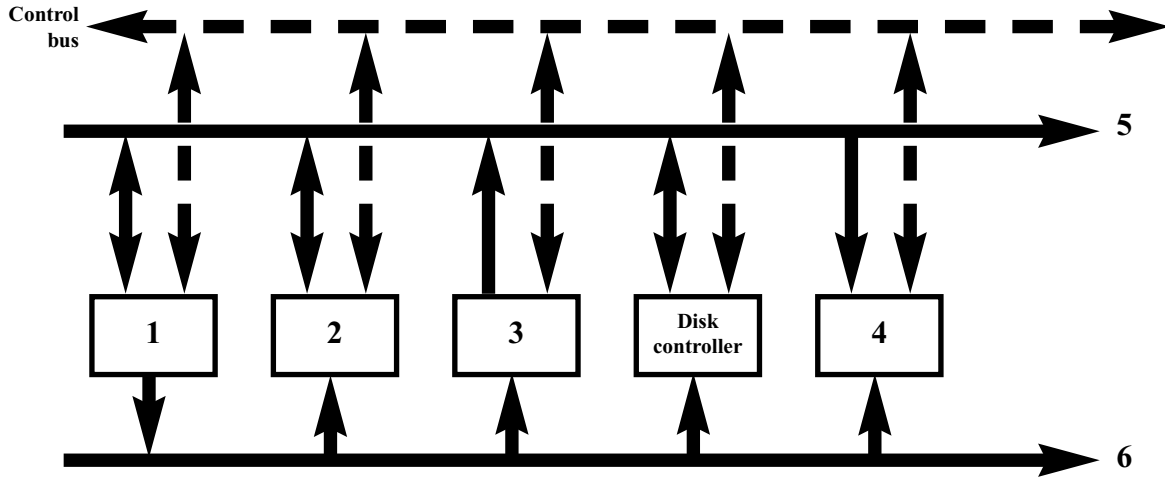
For the language you have named in (d) (i) above, give an example, using the correct syntax, of:

(ii) iteration:
.....
.....
(2 marks)

(iii) selection:
.....
.....
(2 marks)

4 Some of the internal components of a computer system are processor, main memory, control bus, address bus, data bus, keyboard controller, VDU controller, disk controller.

The diagram below shows how these are connected.



(a) Give the correct name for each of the following as labelled in the diagram above:

- 1
- 2
- 3
- 4
- 5
- 6

(6 marks)

(b) If the data bus consists of 8 lines what is the largest denary value which could be transferred in one go?

.....
(1 mark)

(c) Computer systems built using the von Neumann architecture use the stored program concept.

(i) Where is a program stored while it is being executed?

.....
(1 mark)

(ii) Where is the data stored?
(1 mark)

Turn over ►

5 A program has been written to analyse the results of a survey. For **each** of the following, name a suitable data type and give a reason for your choice:

(a) number of cars owned by a household;

data type: (1 mark)

reason: (1 mark)

(b) a telephone number such as 0122456789;

data type: (1 mark)

reason: (1 mark)

(c) whether a household's accommodation has central heating or not;

data type: (1 mark)

reason: (1 mark)

(d) the average number of cars owned by the households.

data type: (1 mark)

reason: (1 mark)

6 The structured approach when writing programs uses functions and procedures.

(a) Give **two** reasons why procedures are used.

1
.....
2
..... (2 marks)

(b) What are parameters used for in the context of procedures and functions?

.....
..... (1 mark)

8

3

7 Bit patterns can be interpreted in a number of different ways. A computer word contains the bit pattern 0011 0110.

(a) What is its decimal value if it represents:

(i) a pure binary integer: (1 mark)

(ii) a BCD (Binary Coded Decimal)? (1 mark)

(b) Give **one** advantage of BCD over pure binary.

.....
..... (1 mark)

(c) (i) The ASCII value for the character '2' is 50. What is the character stored in the computer word 0011 0100?

..... (2 marks)

(ii) Name **one** other standard coding system for coding information expressed in character or text-based form.

..... (1 mark)

(d) One method of storing graphics in a computer system is as vector graphics.

(i) Name **one** other method.

..... (1 mark)

(ii) Describe how a black-and-white image would be stored using your method.

.....
.....
.....
..... (2 marks)

8 The operators DIV and MOD perform integer arithmetic.
 x DIV y calculates how many times y divides into x, for example 7 DIV 3 = 2.
 x MOD y calculates the remainder that results after the division, for example 7 MOD 3 = 1.

(a) The following algorithm uses an array Result. Dry run this algorithm by completing the trace table below.

```

x ← 5
Index ← 0
REPEAT
  y ← x MOD 2
  x ← x DIV 2
  Index ← Index + 1
  Result[Index] ← y
UNTIL x = 0
  
```

y	x	Index	Result		
			[3]	[2]	[1]
–	5	0	–	–	–
1	2	1	–	–	1

(6 marks)

(b) What is the purpose of this algorithm?

.....
 (1 mark)

9 One method of sending data to a printer is by using *parallel transmission*.

(a) What is meant by parallel data transmission?

.....

 (1 mark)

(b) Parallel transmission should **not** be used over long distances.

(i) Why not?

.....

 (1 mark)

(ii) How should data be transmitted over long distances?

.....

 (1 mark)

7

3

10 (a) The ASCII coding system uses 7 bits to code a character. The eighth bit is used as a parity bit. Explain how a parity bit is used when transmitting ASCII codes using even parity.

.....
.....
.....
.....

(3 marks)

(b) What is the relationship between bit rate and bandwidth?

.....
.....

(1 mark)



END OF QUESTIONS

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