

Surname						Other Names					
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General Certificate of Education  
 January 2002  
 Advanced Subsidiary Examination



**COMPUTING** **CPT1**  
**Unit 1 Computer Systems, Programming and Networking Concepts**

Tuesday 15 January 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			
8			
9			
10			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

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

1 (a) Some of the basic components of a computer system are processor, main memory, and secondary storage.

(i) What connects the processor and main memory?

.....  
(1 mark)

(ii) What is the purpose of secondary storage?

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

(iii) Describe what happens during the fetch-execute cycle.

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

(b) (i) Machine code is the first generation programming language. What is the second generation?

.....  
(1 mark)

(ii) A programmer writes a program in a second generation programming language. What has to be done to this program before it can be executed?

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

(iii) Some high level languages are classified as *imperative*. What is meant by imperative?

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

(iv) Give an example of an imperative high level language.

.....  
(1 mark)

(v) What is the relationship between an imperative high level language statement and its machine code equivalent?

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

(vi) Give **two** disadvantages of programming in first and second generation programming languages compared with imperative high level languages.

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

12

2 Some personal computers are referred to as 32-bit machines. This means their word length is 32 bits.

(a) What is a word in this context?

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

(b) State the different values for one bit. ....  
(1 mark)

(c) Give **three** different interpretations which can be associated with a pattern of bits in a 32-bit word.

1 .....  
2 .....  
3 .....  
(3 marks)

5

Turn over ►

3 When purchasing a personal computer, an operating system is always included. Some advertisements also include in the price software such as an *integrated package*.

(a) Explain what is meant by an integrated package.

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

(1 mark)

(b) A utility program is a type of system software. Name **two** utilities.

1 .....  
2 .....

(2 marks)

(c) Name **two** other types of system software.

1 .....  
2 .....

(2 marks)

4 (a) Data can be stored inside a computer system in several different representations. The number 25 is to be stored in a 16-bit word.

What is the bit pattern if the number 25 is to be stored as

(i) a pure binary integer;

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1 mark)

(ii) a BCD (Binary Coded Decimal)?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(1 mark)

(b) The ASCII code for the character '3' is the decimal number 51.

(i) What is the ASCII code for the character '5'? .....  
(1 mark)

(ii) If eight bits are used to store one character, what is the bit pattern when the string '25' is stored in a 16-bit word?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(2 marks)

5

5

5 Video RAM (VRAM) is separate memory on the graphics card, into which the processor writes screen data which are then read to the screen for display. A computer has a colour monitor and 1Mb (Megabytes) of VRAM, and its screen display has been set to a resolution of 1024 x 1024.

(a) Exactly how many bytes are 1Mb?.....  
(1 mark)

(b) What is a pixel? .....  
.....  
(1 mark)

(c) (i) What does a resolution of 1024 x 1024 mean?  
.....  
.....  
(1 mark)

(ii) How many bytes would be available to represent each pixel in the above computer system?  
.....  
(1 mark)

(iii) How many colours can this computer system display? .....  
(1 mark)

6 To convert sound into a form which can be stored in a computer system, a device called an A-to-D converter is required.

(a) What type of signal is sound?  
.....  
(1 mark)

(b) What does an A-to-D converter do?  
.....  
.....  
(1 mark)

5

2

Turn over ►

7 The following code is part of a high level language program:

```

CONST Max = 5;
VAR Tptr : INTEGER;
VAR Store : ARRAY[1..Max] OF CHAR;

PROCEDURE add (a: CHAR);
BEGIN
  IF Tptr < Max THEN
    BEGIN
      Tptr := Tptr + 1;
      Store[Tptr] :=a;
    END;
  END;

FUNCTION Take : CHAR;
VAR Ptr: INTEGER;
BEGIN
  IF Tptr>0 THEN
    BEGIN
      Take := Store[1];
      Tptr := Tptr-1;
      FOR Ptr := 1 TO Tptr DO store[Ptr] := store[Ptr+1]
    END;
  END;
END;

```

(a) Identify the following by copying **one** relevant statement from the above code.

- (i) constant definition.....  
(1 mark)
- (ii) variable declaration .....  
(1 mark)
- (iii) local variable .....  
(1 mark)
- (iv) global variable .....  
(1 mark)
- (v) parameter .....  
(1 mark)
- (vi) assignment statement .....  
(1 mark)
- (vii) selection statement .....  
(1 mark)
- (viii) iteration.....  
(1 mark)

(b) Functions and procedures are both subroutines. What is a difference between a function and a procedure?

.....  
.....

(1 mark)

9

8 A stand-alone computer system is set up with *parallel data transmission* to a printer.

(a) What is parallel data transmission?

.....  
.....

(1 mark)

(b) What is meant by handshaking in this context?

.....  
.....

(2 marks)

3

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

9 A small company has several stand-alone computers which staff use for word-processing letters and accessing the products catalogue, stored in a database, to answer telephone enquiries from customers. A copy of the database is stored on each machine.

(a) The company has been advised that networking the computers would be beneficial.

(i) State **two** advantages for the business of a local area network (LAN):

1.....  
.....  
.....  
2.....  
.....  
.....

(2 marks)

(ii) What extra hardware is needed on each stand-alone computer to connect it to a LAN via cables?

.....

(1 mark)

(b) Computers could be connected in a topology such as a star network or a bus network.

(i) State **one** advantage of a star network over a bus network.

.....  
.....

(1 mark)

(ii) State **one** advantage of a bus network over a star network.

.....  
.....

(1 mark)

(c) The company director is also interested in trading via the internet, and is advised to get a *domain name*.

(i) What is a domain name?

.....  
.....

(1 mark)

(ii) Give an example of a domain name.

.....

(1 mark)

(d) A staff newsletter is published regularly and a copy pinned to the notice board for staff to read. One member of staff suggests it would be easier for colleagues to read the newsletter if it were published on the company *intranet*.

What is an intranet?

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

(2 marks)



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

- 10 (a) The series of characters J, F, H, U, S, X, T are to be entered into a binary search tree in the order given. Draw a diagram to show how these values will be stored.

(4 marks)

- (b) The following data are held in arrays Data, L and R:

Data	‘J’	‘F’	‘H’	‘U’	‘S’	‘X’	‘T’
	[1]	[2]	[3]	[4]	[5]	[6]	[7]

L	2	0	0	5	0	0	0
	[1]	[2]	[3]	[4]	[5]	[6]	[7]

R	4	3	0	6	7	0	0
	[1]	[2]	[3]	[4]	[5]	[6]	[7]

Using the arrays above, dry-run the following pseudo-code by completing the trace table opposite:

```

Item ← ‘T’
Ptr ← 1
WHILE Data[Ptr] < > Item DO
  PRINT Data[Ptr]
  IF Data[Ptr] > Item
    THEN Ptr ← L[Ptr]
    ELSE Ptr ← R[Ptr]
  ENDIF
ENDWHILE
PRINT Data[Ptr]

```

Trace Table:

<b>Item</b>	<b>Ptr</b>	<b>Printed Output</b>
'T'	1	'J'

(6 marks)

10

**END OF QUESTIONS**

**THERE ARE NO QUESTIONS PRINTED ON THIS PAGE**