ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCE

Computing

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334
Registered address: Addleshaw Booth & Co., Sovereign House, PO Box 8, Sovereign Street, Leeds LS1 1HQ
Kathleen Tattersall: *Director General*

The following notation is used in the mark scheme

- **; - means a single mark;**
- **// - means alternative response;**
- **/ - means alternative word or subphrase**
- **A. – means acceptable creditworthy answer;**
- **R. – means reject answer as not creditworthy;**
- **I. – means ignore.**

1 Queue is FIFO ; **1**
Stack is LIFO; **1**
Given that:
Process of taking elements from queue to stack **1**
Process of popping stack **1**

Total 4

2 (a) interrupting device supplies;
an offset; **A** index, indexed address
added to the base address; **A** base register
Any two of these for 2 marks
gives start address of interrupt service routine / ISR; **2**
R Interrupting device supplies start address of ISR **1** **3**

(b) a different routine can be easily introduced /
routine can be relocated / dynamically loaded **1** **1**
(the interrupting device only needs to supply a new offset);

Total 4

3
```
TForm1 = Class(TForm)                                   1
            Button1:Tbutton;
            Button2:Tbutton;                            1
         End                                            1
```

NB 1 mark for BOTH buttons

//

```
Class Tform1 extends Tform
            {Tbutton Button1;
             Tbutton Button 2;
            }
```

Must look like code.
*1 mark for connecting TForm1 to Tform **A** inherits, :*
*1 mark for defining both buttons as type Tbutton **A** As*
1 mark for {} or End

Total 3

4 (a) (i) positive **1**

(ii) $<2^{-2}$ **1** **2**

(b) Correct answer 194.5 or 194 1/2 **2**
working **1** **3**

If wrong answer, method marks as follows:
exponent 2^8 *clearly identified* **1**
application of shift / $*2^8$ from correct start point **1**
correct interpretation of bits **1**

Basically here, if it is a little inaccurate, give 2 marks, if quite inaccurate but slightly correct give 1.

max **2**

(c) (i) Processing fixed point numbers is quicker than floating point / less processing required;
More accurate/greater precision; **1**

(ii) Where the possible range of numbers to be stored is limited / small;
Where number is of a set format / processing integers /
Working with currency;
Where maximum precision is required **1** **2**

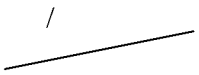
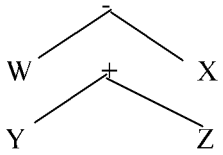
Total **7**

5 (a) Needs a specific device/ resource; *1 mark for an example or 1 mark for generic resource: input device / output device / memory / backing store / user input*
Interrupt being serviced / interrupted from a higher priority process;
Time slice used up / waiting for processor time /waiting for next time slice;
1 mark for each of 2 reasons to max: **2**

(b) Concepts:
Threads share unprotected data;
Processes are self contained; **2**

Threads share more of their environment with each other than do processes under multitasking;
There is very little protection of one thread from another, in contrast to multitasking;
Threads may be distinguished only by the value of their program counters and stack pointers;;
while sharing a single address space and set of global variables.;
1 mark for each of 2 points to max: **2**

Total **4**

6	(a)	Head (Tail (Days)) = Mon	**R** [Mon], MON	**1**	
		Tail([Head(Days)]) = [ ]		**1**	
		Empty(Tail(Tail(Tail(Days))))=False		**1**	**3**
	(b)	⌈Elements in a list can only be accessed sequentially; ⌊⌈elements in an array can be accessed directly; ⌊using the subscript; *Any 2 points to max*			**2**
				Total	**5**
7	(a)	(Technique whereby) hard disk is used; **A** secondary storage, hard (disk) drive **R** backing storage (to supplement) main memory when it is not large enough; **A** primary memory, RAM for the execution of a process / processes; **A** program *1 mark for each of 3 points*			**3**
	(b)	Memory is (conceptually) divided into a number of fixed sized pages / page frames; **A** segments The (virtual address space of a) program / process is divided into fixed size pages; (Two different sorts of) pages are the same size; Page table indicates which pages of a process are loaded and where; Pages are loaded as required; Pages are copied out of main memory before being overwritten; *Can carry forward/back* *1 mark for each of 3 points to max:*			**3**
				Total	**6**
8	(a)	root, branch . leaf node *must circle!*		**1** **1** **1**	
	(b)	left sub-tree right sub-tree		**1** **1**	
	(c)	W-X / Y+Z 1 1 1 **A** column vector *Spurious punctuation*		**3** **-1**	
				Total	**8**

9 (a) The set / list of bit patterns / binary codes representing machine operations;
The set / list of bit patterns / binary codes for which machine operations have been defined;
The collection of different operations available; **1** **1**
A commands **R** interpreted, R A set / collection etc

(b) 64 or 2^6 **1** **1**

(c) (i) immediate: operand field contains datum to be operated on; **1**

(ii) direct: operand field contains address of datum to be operated on; **1**

(iii) indirect: operand field contains a memory address; **1**

The content of the location within this memory address is the address of the datum; **1**
R if describing indexed
//operand is the address; **1**
of the address of the data; **1** **4**

(d) (i) B3 = 1011 0011 **1**

(ii) 62 C1 **2**
B2 AB **2** **5**
1 for operator, 1 for operand for each statement
If extra 'field' in line, lose both marks

(e) (i) 255 / 2^8 –1 / FF_{16} **A** FF, 11111111_2; **1**

(ii) 65535 / 64k –1 / 2^{16} –1 / $FFFF_{16}$;; **2** **3**
FFFF **1**

Total **14**

10	(a)	(i)	Any from clauses 1 – 7	**1**	
		(ii)	Any from clauses 8 – 13	**1**	**2**
	A	clause number			
	(b)	(i)	valid;	**1**	
		(ii)	Valid;;	**1**	**2**
	(c)	*Must be at least 1 extra rule (see below)*			
		correct definition of a new noun_phrase and a new sentence		**1**	
		IF, AND in upper case		**1**	
		Variables in upper case		**1**	
		Descriptors in lower case		**1**	
		Logic		**2**	**6**

Suggested:

noun_phrase(X,Y) IF adjective(X) AND noun(Y)

sentence(A,B,C,D,E) IF noun_phrase(A,B) AND verb(C) AND noun_phrase(D,E)

Total **10**