Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/03**

Paper 3 Advanced Theory **For Examination from 2015**

SPECIMEN MARK SCHEME

1 hour 30 minutes

MAXIMUM MARK: 75

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[Turn over

1 **(a)** **(i)** +13
mark as follows:
Exponent: +4 // move the pattern four places
Mantissa: +13/16 // 0.1101
Answer: $13/16 \times 2^4$ // or equivalent [3]

(ii) There will be a unique representation for a number.
The format will ensure the number is represented with the greatest possible/more accuracy/precision.
Multiplication is performed more accurately/precisely. [max 1]

(iii) Mantissa: 0100 0000
Exponent: 1000
Therefore number is $\frac{1}{2} * 2^{-8}$ // +1/512 // $+2^{-9}$ // 0.00195 [3]

(b) The choices made will affect range and accuracy.
More bits used for the mantissa will result in greater accuracy.
More bits used for the exponent will result in a larger range of numbers. [max 2]

[Total: 9]

2 **(a)** Application Layer [1]
Transport Layer [1]
Internet Layer [1]

(b) ethernet / token ring / fibre optic
any two – 1 mark each [2]

(c) **(i)** network ID: the ID common to all computers on a network [1]
host ID: the unique ID of a particular computer on a network [1]

(ii) 205 = 11001101 [1]
It starts with 110, so it is a Class C address. [1]

(iii) network ID: 205.123.4 [1]
host ID: 192 [1]

[Total: 11]

3 (a) monitoring system [1]

(b) temperature sensor [1]
humidity sensor [1]

(c) (i) 16 [1]
FALSE [1]

(ii) Array `Extreme` is a 2D array.
each row corresponds to one of the particular tanks [1]

Columns 1 and 3 contain the minimum values for heat and humidity
and columns 2 and 4 contain the maximum values for heat and
humidity. [1]

(iii) for both heat and humidity:
– test to see whether current reading is lower than set minimum values [1]
– test to see whether current reading is higher than set maximum values [1]
– if values outside range then warning message is output [1]

(iv) The loop causes a delay so that the conditions are not monitored constantly. [1]

(d) LDD 0804 [2]
OR   #B00100000 // OR #32 [2]
STO 0804 [2]

[Total: 17]

4 (a) a signal/message from some device
to indicate that some event has occurred // the device is seeking the attention of the
processor [2]

(b) identify the source of the interrupt
disable all interrupts of a lower priority
save the contents of the PC
save the contents of the other registers ...
onto the stack
load and run the appropriate ISR code
restore the registers
from the stack (stack mentioned 1 mark only ...)
enable all interrupts
continue execution of the interrupted process [max 6]

(c) - partitioning
- memory is divided into partitions
- one or more programs loaded into each partition
- different partitions used for different types of job
- partitions can be of fixed size or dynamic
- programs are scheduled when partition has space for whole program

OR
- paging / virtual memory
- the program is divided into a number of pages // the main memory is divided into a number of page frames (of the same size)
- not all pages of the program need to be initially loaded
- pages swapped in/out of memory as required
- use of page table

OR
- segmentation
- programs are divided into segments <u>by the programmer</u>
- not all segments are initially loaded // segments are loaded as and when required during execution
- segments can be of varying size   [max 6]

[Total: 14]

5 (a)

$X=A.(\overline{A}+\overline{B})$
A.   [1]

$\overline{A}\ \overline{B}$ [1]
+   [1]

(b)
$X = A . \overline{\overline{A}\overline{B}}$ $X = A.\overline{A} + A.\overline{B}$ [1]

$= 0 + A.\overline{B}$ [1]

$= A.\overline{B}$ [1]

(c) logic circuit has:
1 AND gate and 1 NOT gate   [1]
inputs to one NOT gate is B   [1]
inputs to AND gate are A and output from NOT gate   [1]

(d)

A	B	X	Y	
0	0	0	0	[1]
0	1	0	1	[1]
1	0	0	1	[1]
1	1	1	0	[1]

(e) half adder   [1]

[Total: 14]

6 **(a)** <answer 1> - message digest [1]
        <answer 2> - hash [1]
        <answer 3> - private [1]
        <answer 4> - signature [1]
        <answer 5> - public [1]

    (b) The message did not come from Raz. [1]
        The message was altered on its journey. [1]

    (c) Raz encrypts the message [1]
        using Tan's public key [1]
        Tan decrypts the message [1]
        using her private key [1]
        [max 3]

        [Total: 10]

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