THE UNIVERSITY OF NORTHAMPTON

Summer Examinations 2015

CSY101415N

Module Title	Computer Systems
Level	Four
Time Allowed	Two hours

Instructions to students:

- Enter your student number **not** your name on all answer books.
- Answer **three** out of **five** questions.
- All questions are equally weighted. Where a question has more than one part the division of marks is stated.
- Begin each question in a separate answer book; label each answer book clearly with the number of the question you are answering.
- Neither books nor notes may be taken into the examination.
- The use of a non-programmable calculator is permitted.

No. of Pages	5
No. of Questions	5

Answer **three** out of **five** questions.

Question 1

a. Explain what the term mantissa, exponent and sign bit mean, and how these 3 components are stored in the 32 bits storage in terms of the IEEE Single Precision (32bit) Standard.

(6 marks)

b. Convert the following binary numbers into hexadecimal and decimal numbers:

i. 01001100
ii. 10010101
iii. 00111010
iv. 11010000
v. 00011111
vi. 01101110

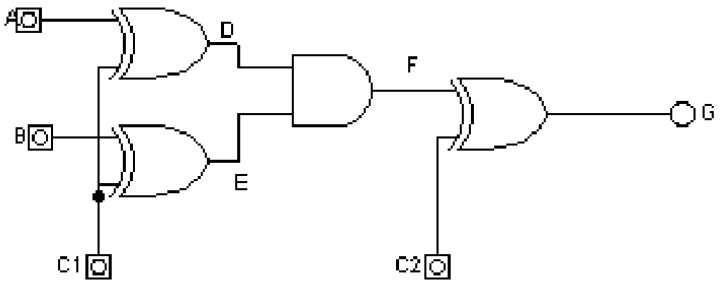
(12 marks)

c. Using 2's complement method to show how 120 – 10 would be calculated in binary (here 120 and 10 are decimal numbers).

(15 marks)
Total: 33 marks

Question 2

a. Complete the truth table as shown in **Table 1** for the circuit below.



C1	C2	A	B	D	E	F	G
0	0	0	0				
0	0	0	1				
0	0	1	0				
0	0	1	1				
0	1	0	0				
0	1	0	1				
0	1	1	0				
0	1	1	1				
1	0	0	0				
1	0	0	1				
1	0	1	0				
1	0	1	1				
1	1	0	0				
1	1	0	1				
1	1	1	0				
1	1	1	1				

Table 1: Truth table

(20 marks)

b. By using the truth table as shown in **Table 2**, where X, Y are inputs, and R is the output:

i. Draw a logic circuit diagram using the Sum of Product method.

ii. Derive the logic expression for the output R.

X	Y	R
0	0	1
0	1	1
1	0	1
1	1	0

Table 2: Truth table

(13 marks)
Total: 33 marks

Question 3

a. Describe what cache memory is. Your description should include any advantage of cache memory over main memory, and also include types of cache memory and their functionalities.

(8 marks)

b. With the aid of an appropriate diagram, describe what a memory hierarchy is and why we need it.

(10 marks)

c.

i. State how the hard disk can be used as a form of memory.

(4 marks)

ii. List three examples of removable storage devices, each using a different method for storing data.

(6 marks)

iii. Describe how data can be stored in a form other than optical media.

(5 marks)

Total: 33 marks

Question 4

a. Describe how several programs appear to be running at the same time in a multi-tasking operating system.

(23 marks)

b. What do the abbreviations RISC and CISC mean and describe the advantages and disadvantages of them in terms of pipelining?

(10 marks)

Total: 33 marks

Question 5

a. With the aid of a diagram and with reference to the fetch-execute cycle, describe the principles of pipelining.

(17 marks)

b.

i. Derive the speedup factor for a pipelined system.

(4 marks)

ii. What is the speedup factor for system of 100 sequential instructions wit h5 stages in the pipeline?

(3 marks)

c. Describe with the aid of a diagram representing the basic states of a process and the transitions between them.

(9 marks)
Total: 33 marks

End of Paper