Solution

North American University

COMP 2316 – Computer Organization – Spring 2015

Midterm Exam

Name

Last Name

Question	Max grade	Grade
1	25	
2	20	
3	15	
4	10	
5	15	
6	10	
7	10	
Total	105	

Rules:

- You have 75 minutes.
- Nobody can enter 15 minutes after the exam starts. Nobody can leave within 30 minutes after the exam starts.
- There will be a sign-in sheet, you have to sign in
- You cannot use extra paper. You can bring 3 pages of cheat sheet. Must be handwritten, with your name on left top corner.
- Minimum punishment for cheating is getting -20 pts out of 100 from this midterm
- After the papers are distributed you cannot move to another seat before instructor's permission
- No electronics (headphones, cell phones, you cannot listen music, watch movie or cartoon during your midterm exam!)
- Cell phones must be turned off all the time.

1) (25 pts, 5 pts each)

A) What is the decimal equivalent of the following unsigned binary number: 10011001_2
(This number has 9 binary digits)

153

B) What is the hexadecimal equivalent of that number?

99

C) Convert the following hexadecimal number to binary form : A5BD

1010010111011101

D) Find the two's complement representation of the following ~~number~~ decimal assuming the word size is 8 bits : - 37

$37_{10} = 00100101_2$

-37 11011010
+ 1
11011011

E) Answer D, assuming the word size is 16 bits.

1111111111011011

2) (20 pts, 10 pts each)

A) Convert the following real, decimal number into 32 bit IEEE floating point format: -32.5, show in hexadecimal form.

$100000.1 = 1.000001 \times 10^5$

$E = 127+5 = 132_{10} = 10000100_2$

$F = 00000100$ $S = 1$ (negative)

$1\ 10000100\ 00000100\ldots = C2020000_{16}$

B) Convert the following hexadecimal number into 32 bit IEEE floating point format : 0.0D6, show in hexadecimal form.

$0.0000110101110_2 = 1.1010110 \times 10^{-5}$

$E = 127-5 = 122_{10} = 01111010_{16}$

$F = 1010110\ldots$

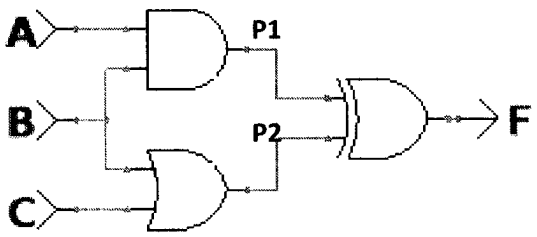
$S = 0$

3D560000

$0\ 01111010\ 10101100\ldots$

3 D 5 6

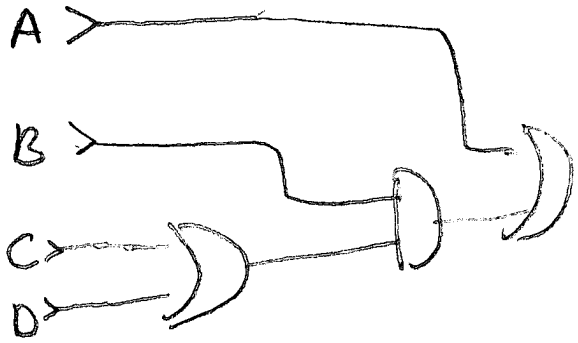
3) Fill in the truth table to represent the intermediate values and output of the circuit: (15 pts)



A	B	C	P1	P2	F
0	0	0	0	0	0
0	0	1	0	1	1
0	1	0	0	1	1
0	1	1	0	1	1
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	1	1	0
1	1	1	1	1	0

4) Design a logic circuit to implement X= ~~A+(B+C.D)~~, no simplification needed. (10 pts)

A + B(C+D)



5) Simplify the following Boolean expression : ABCD' + ABC' + B (15 pts) (show steps)

B

6) Fill in the blanks by doing necessary conversions(MB= megabyte, Mb = Megabit, KB= Kilobyte, TB = Terabyte, Tb = Terabit, GB = Gigabyte) - 10 pts

1024×8 =

a) 10 MB = 10240 KB

b) 10 MB = 81920 Kb

7) Why computers use two's complement system to represent integers? (Hint: compare with sign and magnitude representation) (10 pts)