CSCE-312 Quiz1 SP'16 (15 points)

Student Name ....AAKASH TYAGI..

Student ID ....

0.5' 0.5'

Question 1a. [3 points, 1 point each] Convert the following 6-bit binary numbers to decimal and hexadecimal formats. For example 011101 would be 29 in Decimal and 1D in Hexadecimal format.

a. 11|1111

Working from LSB we get the following result

$= 1 + 2 + 4 + 8 + 16 + 32 = 63$ 0.5'

Hex: 0x3F 0.5'

b. 10|0000

This is simply 2^5 since other bits are Ø

$= 32$

Hex: 0x20

c. 00|1011

Working from LSB

$= 2^0 + 2^1 + 2^3 = 8 + 2 + 1 = 11$

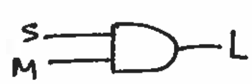
Hex: 0x0B

Question 1b. [4.5 points] Strobe Light Control System: A DJ ("disc jockey," meaning someone who plays music at a party) would like a system to automatically control a strobe light and disco ball in a dance hall depending on whether music is playing and people are dancing. A sound sensor has output S that when 1 indicates that music is playing, and a motion sensor has output M that when 1 indicates that people are dancing. The strobe light has an input L that when 1 turns the light on, and the disco ball has an input B that when 1 turns the ball on. The DJ wants the disco ball to turn on only when music is playing and nobody is dancing, and wants the strobe light to turn on only when music is playing and people are dancing. **Create equations describing the desired behavior for B and for L, and then convert each to a circuit using AND, OR, and NOT gates.**

(1) $B = S \cdot M'$

(2) $L = S \cdot M$

(3)


(4)


All are right, 4.5'

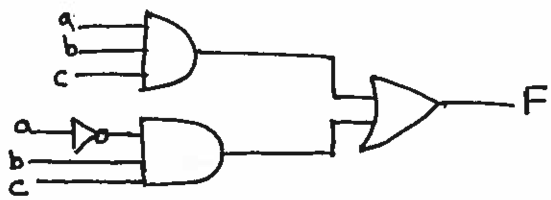
Any one incorrect, −1

All wrong, 0

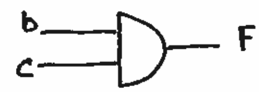
Question 1c. [4.5 points, 1.5 points each] Convert each of the following equations directly to gate-level circuits using AND, OR, NOT gates only. <u>You may implement the logic AS IS, i.e. no need to minimize.</u>

1. F = abc + a'bc

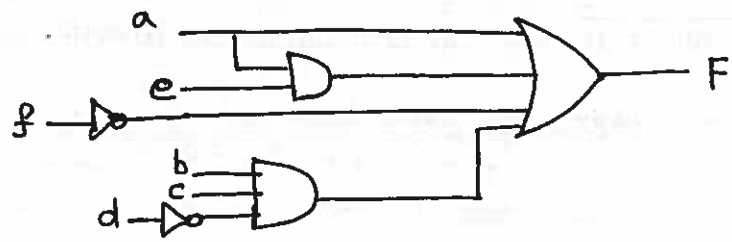
partial correct give 0.5'



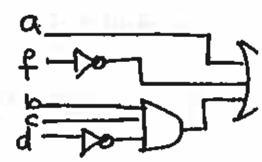
OR



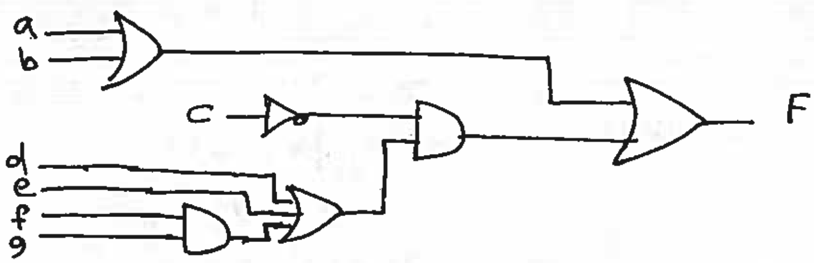
2. F = a + bcd' + ae + f'



OR



3. F = (a + b) + (c' * (d + e + fg))



Question 1d. [3 points] Use Boolean algebraic manipulation to minimize the equation: F = a'b'c + a'bc' + a'bc + ab'c + abc' + abc

$a'b'c + a'bc' + a'bc + ab'c + abc' + abc$

$a'b'c + a'b(c'+c)$ 0.5' $+ ab'c + ab(c'+c)$ 0.5'

$a'b'c + a'b + ab'c + ab$

$= a'(b'c+b)$ 0.5' $+ a(b'c+b)$ 0.5'

$= a'(b+c)$ 0.5' $+ a(b+c)$ 0.5'

$= (b+c)(a'+a)$

$= b+c$