2022-2023 Logic Circuits Final Exam

A combinational circuit that takes 2-bit signed 2's complement form A number (A1A0) and B number (B1B0) as input is requested to perform C=A+B operation in signed 2's complement form at its output.

Q1: How many bits are required for output?
a)2 b)3 c)4 d)5

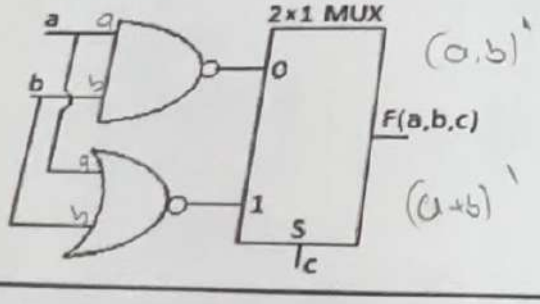
Q2: What is the logical expression of the least significant output?
a) $A_0 B_0$ b) $A_0 \oplus B_0$ c) A_0+B_0 d) $A_0.B_0$

Q3: How many 2-input Nand gates can we achieve the least significant output with? (NOT including Gates will be)
a)2 b)3 c)4 d)5

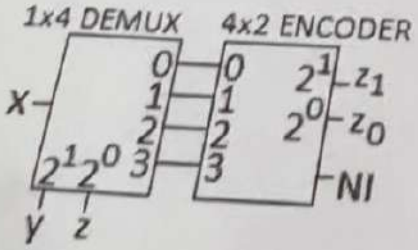
Q4: We want to design a circuit with a minimum number of AND, OR, and NOT gates that will allow a 4-bit A number (A3A2A1A0) to output 1 if it is greater than 10 (10 in decimal system). What would be the logical expression of the output?
a) A_3+A_1 b) $A_3+A_1 .A_0$ c) $A_3A_2+ A_3A_1A_0$ d) $A_3A_2 + A_1 .A_0$

Q5: X is a 3-bit number in 2's complement form. Our combinatorial circuit is required to perform Z=X2+2X+1. How many bits must the Z output in 2's complement form be?
a)4 b)5 c)6 d)7

Q6: The minterms of the F output of the circuit below What is the expression in terms of?
a)$\sum(2,4,6,7)$ b) $\sum(4,5,6,7)$ c) $\sum(1,3,5,6,7)$ d) $\sum(0,1,2,4)$



Answer 3 questions according to the circuit below.
NOT: NI output 1 if no information comes to the inputs of the encoder and in this case the outputs z1 and z0 are unimportant.



Q7: What is the expression for the z1 output?
a)x b)y c)z d)x'

Q8: What is the expression for the z0 output?
a)x b)y c)z d)x'

Q9: What is the expression for the NI output?
a)x b)y c)z d)x'

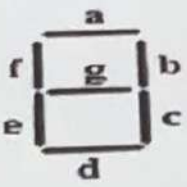
Q10: A decoder circuit will be designed for the 7-segment display with common anode. Depending on the inputs (S1 and S0) of the decoder circuit, it is desired to display the numbers between 0 and 3. Based on this information, what would be the logical expression of the a segment output?

S_1S_0 = 00 ise

S_1S_0 = 01 ise

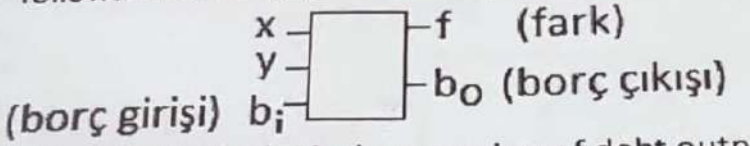
S_1S_0 = 10 ise

S_1S_0 = 11 ise



a) $S_1'.S_0$ b) $S_1'+S_0$ c) S_1+S_0 d) S_1+S_0'

The block representation of the full extractor is as follows. Accordingly, answer 2 questions.



Q11: What is the logical expression of debt output?

a) $x'.b_i + x'y + y.b_i$ b) $x'y+b_i$ c) (x y)b_i d)xyb_i

Q12: Complete extractor with decoder and OR gates we want to realize. How should we choose?

a) 1 tane 2x4 decoder, 2 OR gate

b) 1 tane 3x8 decoder, 2 OR gate

c) 1 tane 2x4 decoder, 1 OR gate

d)2 tane 3x8 decoder, 1 OR gate

Q13: f(a,b,c,d) prime implicants ;

c'd' , ac' , a'bd' , a'bc and then

Which of the following is not a esential prime implicants?

a) c'd' b) ac' c) a'bd' d) a'bc

Q14: What would be the f output of the circuit below?

a) xy'+z b)x'+y c)x'yz d)x'+y'+z'