Instruction:

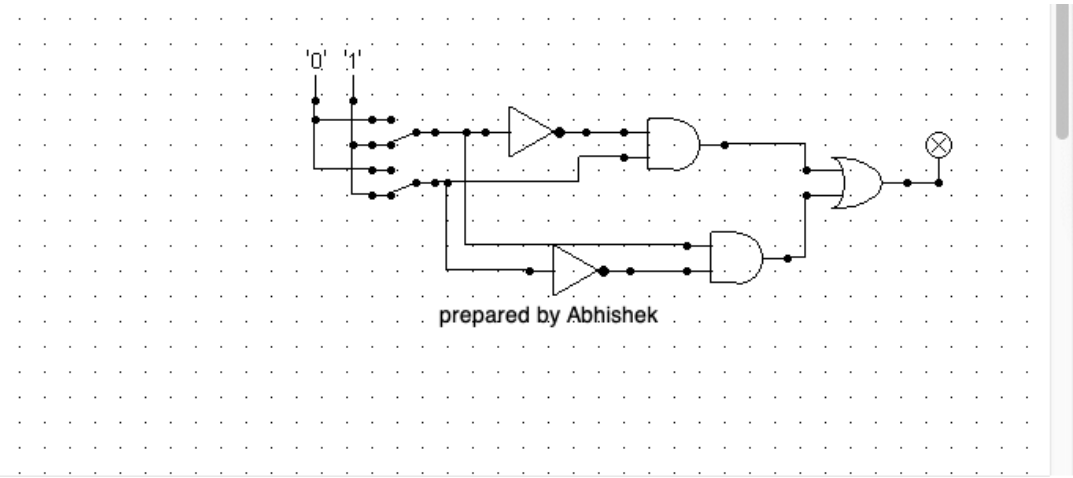
Complete all questions in **1 hour.**

1. The table below shows the Truth table of Half Subtractor, write SOP expression for difference, and borrow and design the circuit using Logsim.

A	B	Difference	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

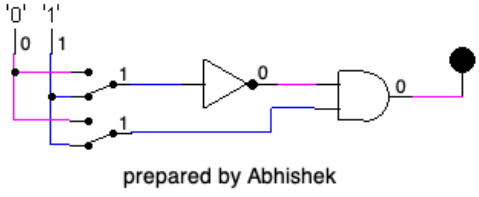
Difference

! A.B + A.B!

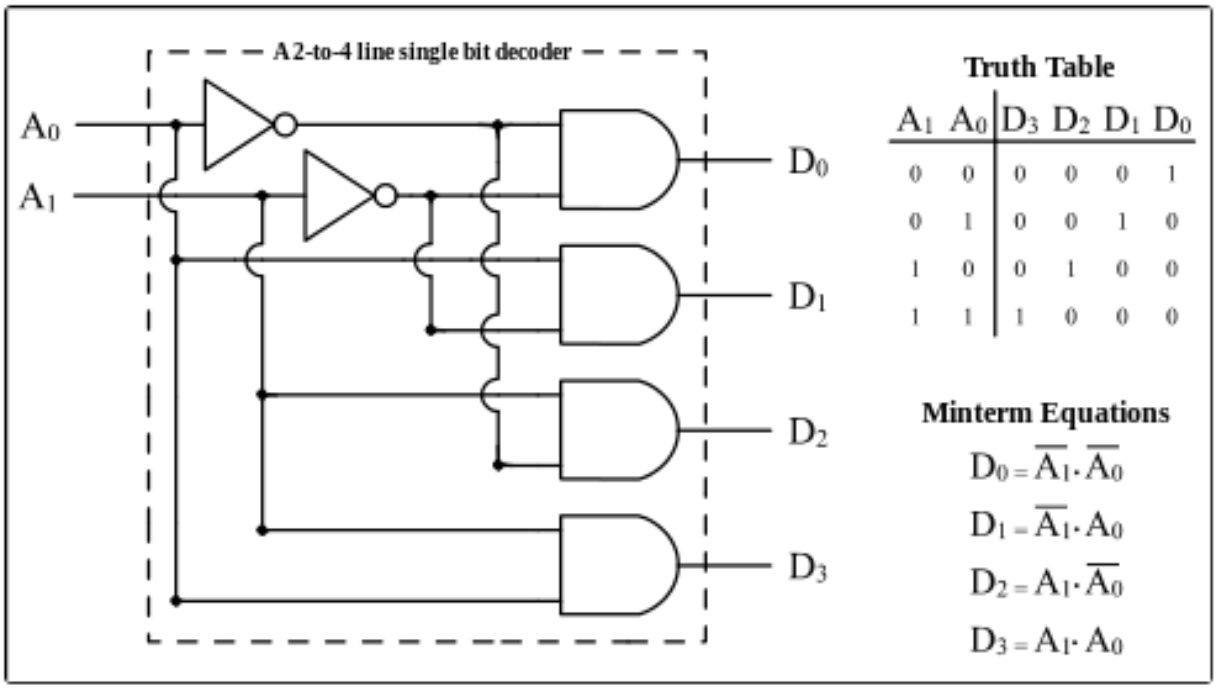


Borrow

! A. B



2. Design 2:4 decoder using logsim and Construct Truth table.



Truth Table

A_1	A_0	D_3	D_2	D_1	D_0
0	0	0	0	0	1
0	1	0	0	1	0
1	0	0	1	0	0
1	1	1	0	0	0

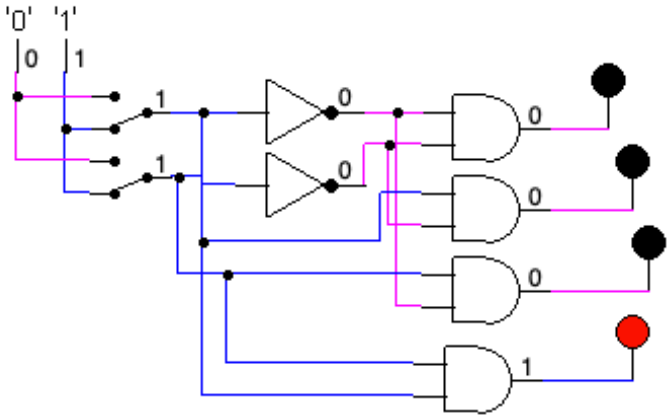
Minterm Equations

$D_0 = \overline{A_1} \cdot \overline{A_0}$

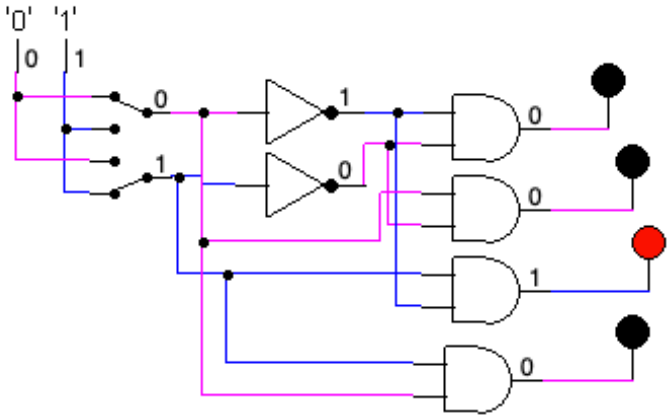
$D_1 = \overline{A_1} \cdot A_0$

$D_2 = A_1 \cdot \overline{A_0}$

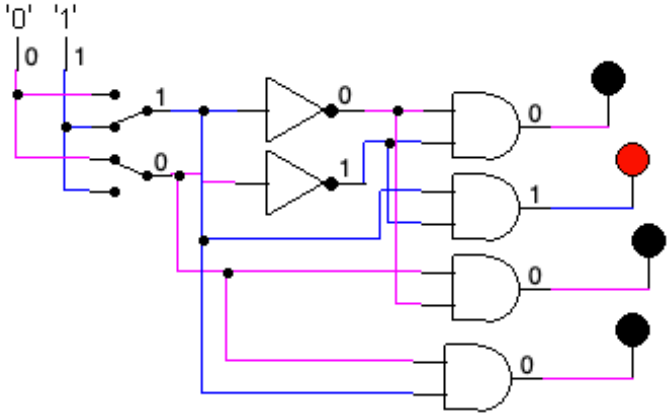
$D_3 = A_1 \cdot A_0$



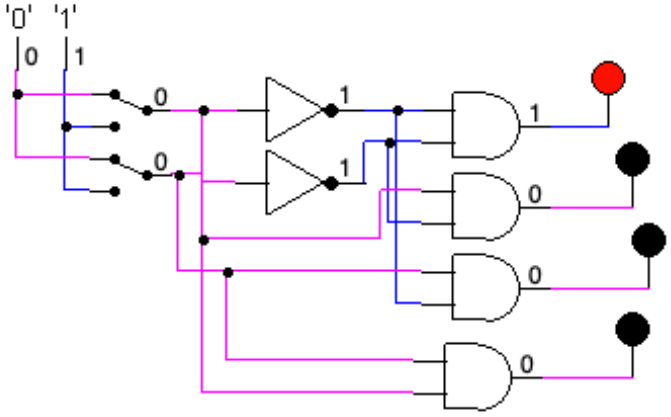
prepared by Abhishek



prepared by Abhishek

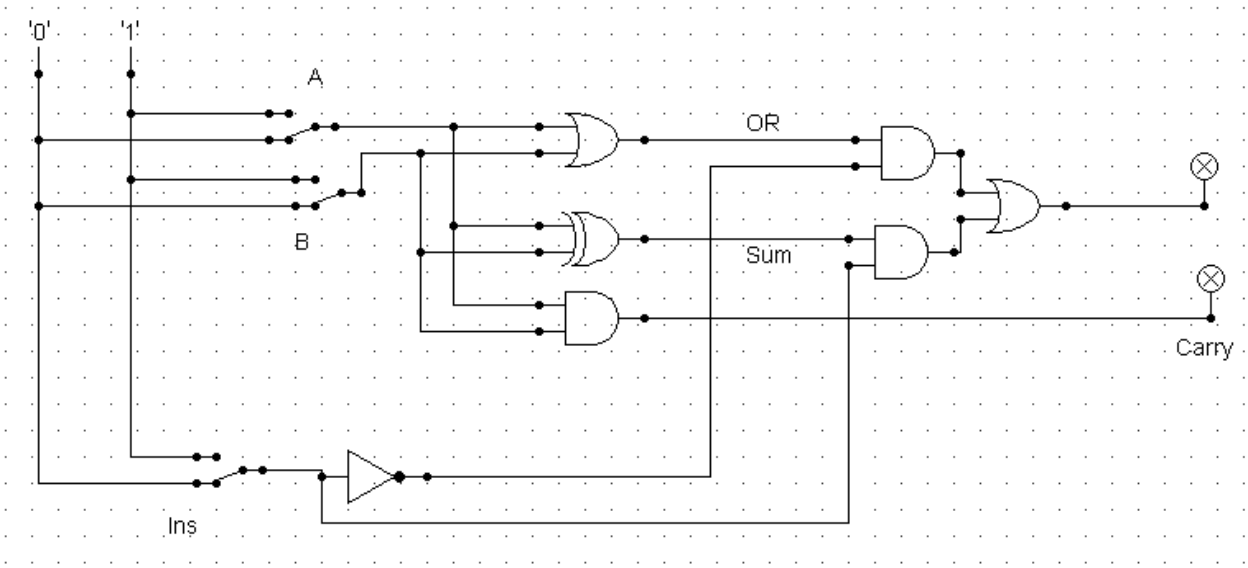


prepared by Abhishek

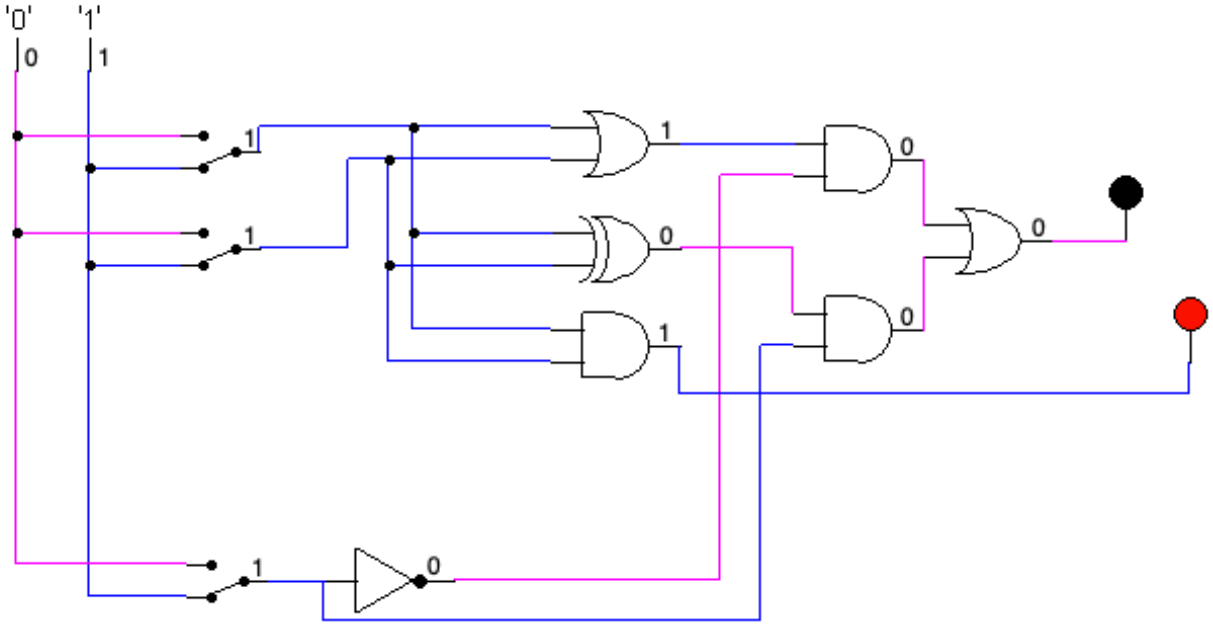


prepared by Abhishek

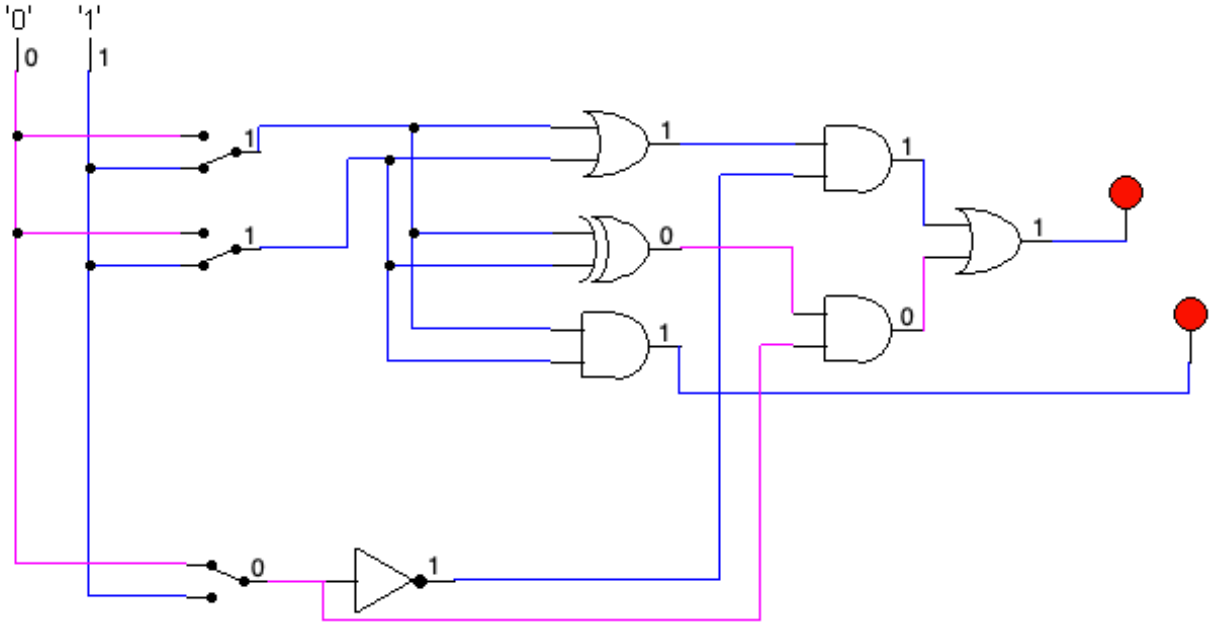
3. Draw the following simple ALU circuit using Logsim and describe the outputs when instructions are 1 and 0.



A	B	INS	OUTPUT	CARRY
0	0	0	0	0
0	0	1	0	0
0	1	0	1	0
0	1	1	1	0
1	0	0	1	0
1	0	1	1	0
1	1	0	1	1
1	1	1	0	1

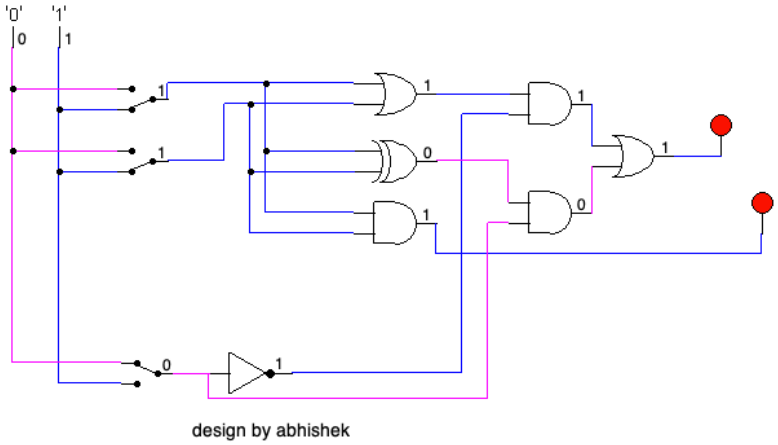


design by abhishek



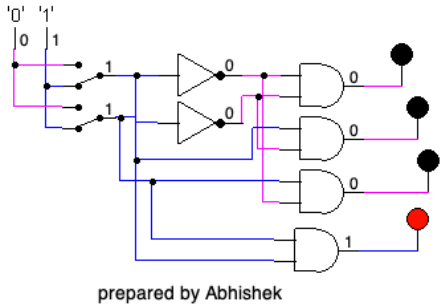
design by abhishek

4. Write sort notes on the following topic:
= ALU



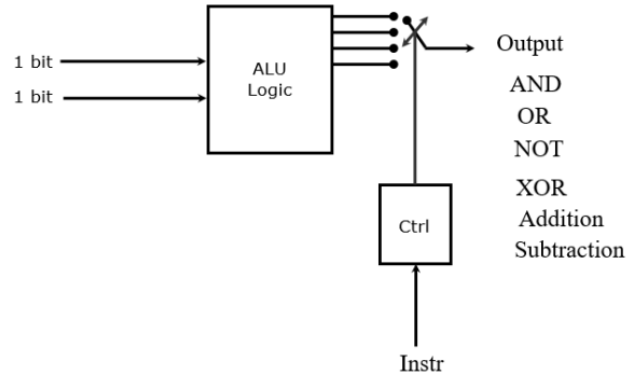
ALU is also known as Arithmetic Logical unit, is simply an operator for a computer. It is a major component of the CPU in a computer system. ALUs, in addition to doing addition and subtraction calculations, also handle the process of multiplication of two integers because they are designed to perform integer calculations; thus, the result is likewise an integer. Division operations, on the other hand, are frequently not done by ALU since division operations can result in a floating-point value. Instead, division operations are normally handled by the floating-point unit (FPU), which may also execute other non-integer calculations.

= Decoder



The basic function of a decoder is to detect the presence of a specified combination of bits on its inputs and to indicate that presence by a specified output level. A decoder has n input lines o handles n bits and from one to 2^noutput lines to indicate the presence of one or more n – bit combinations.

= Multiplexer



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