National University of Computer and Emerging Sciences, Karachi
Spring – 2023, FAST School of Computing
Midterm Examination Solution
21, March, 2023 08:10 AM – 9:30 AM

Course Code: EL1005	**Course Name: Digital Logic and Design Lab (Code: A)**
Instructor Name:	
Student ID:	**Section: BCY-2A**
Total Time: 80 Minutes	**Total Points: 50 Points**

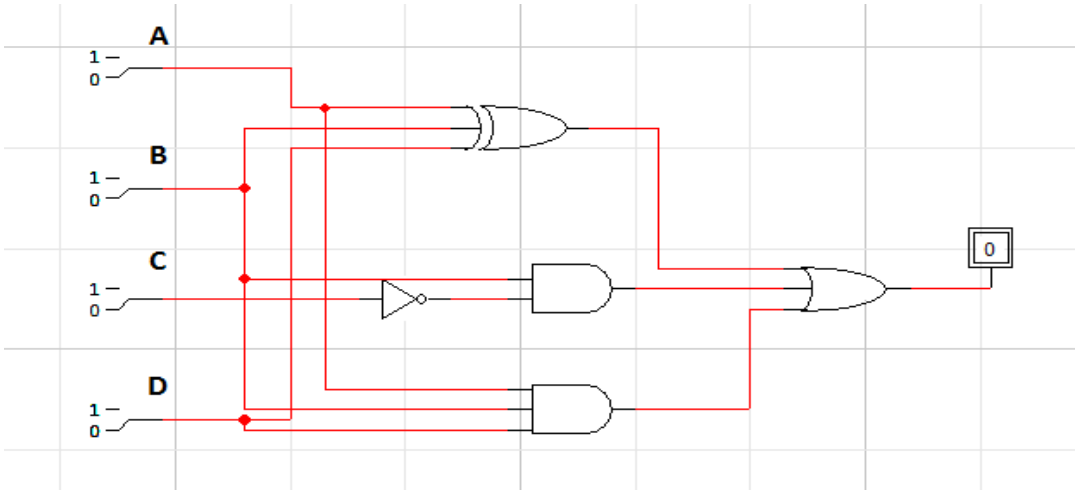
Instructions:

- Return the question paper mention your **student ID on it.**
- Read each question completely before answering it. **There are 4 questions on 2 pages**.
- **Cheating in any case will lead to F-GRADE as per university rule.**
- No USB, No MOBILE, No Smartwatch, No Internet are allowed in exam submission on local storage.
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
- You must comment your student ID on circuit diagram.
- Create a ZIP folder of all your solutions and copy it in the local storage with the title K22-xxxx_A.
- Submission are on local storage that can be accessed using win+r keys and entering \\172.16.5.41 address in the dialog box.
- Enter your username as khifast\K22xxxx and its assigned password.
- Zip folder needs to be pasted in the "Exam Submission\teacherName" folder

Question # 1 **[LLO-2 – 7.5 - POINTS]**

Design a logic circuit of the given Boolean expression.

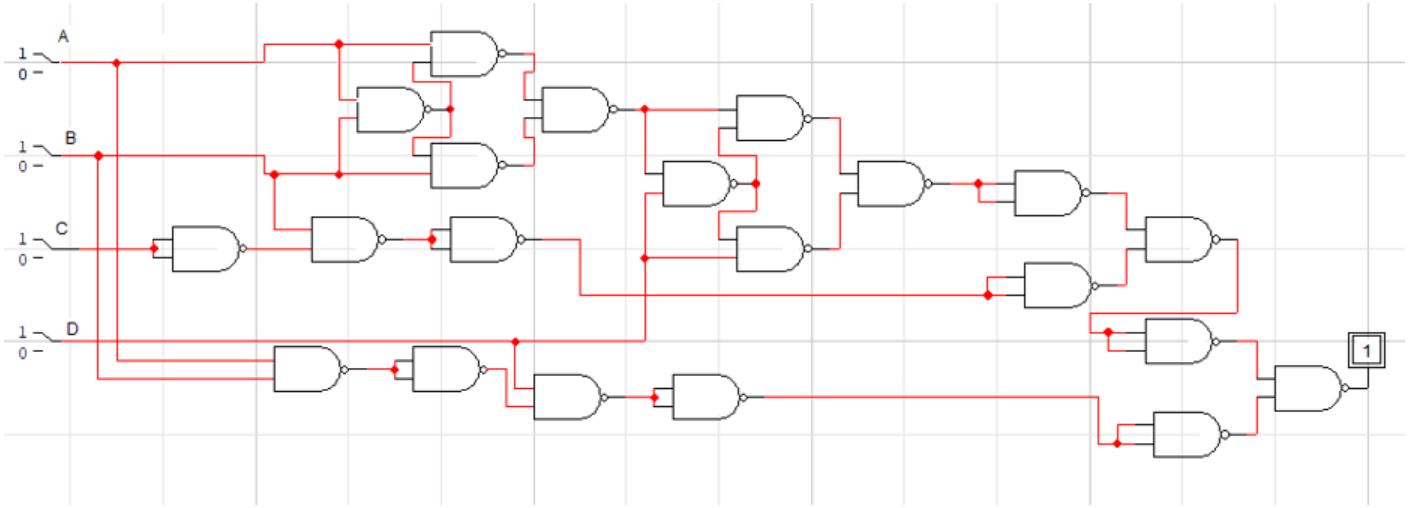
Solution # 1



Question # 2 **[LLO-1 – 7.5 - POINTS]**

Redraw the logical circuit of question1 using NAND gate only.

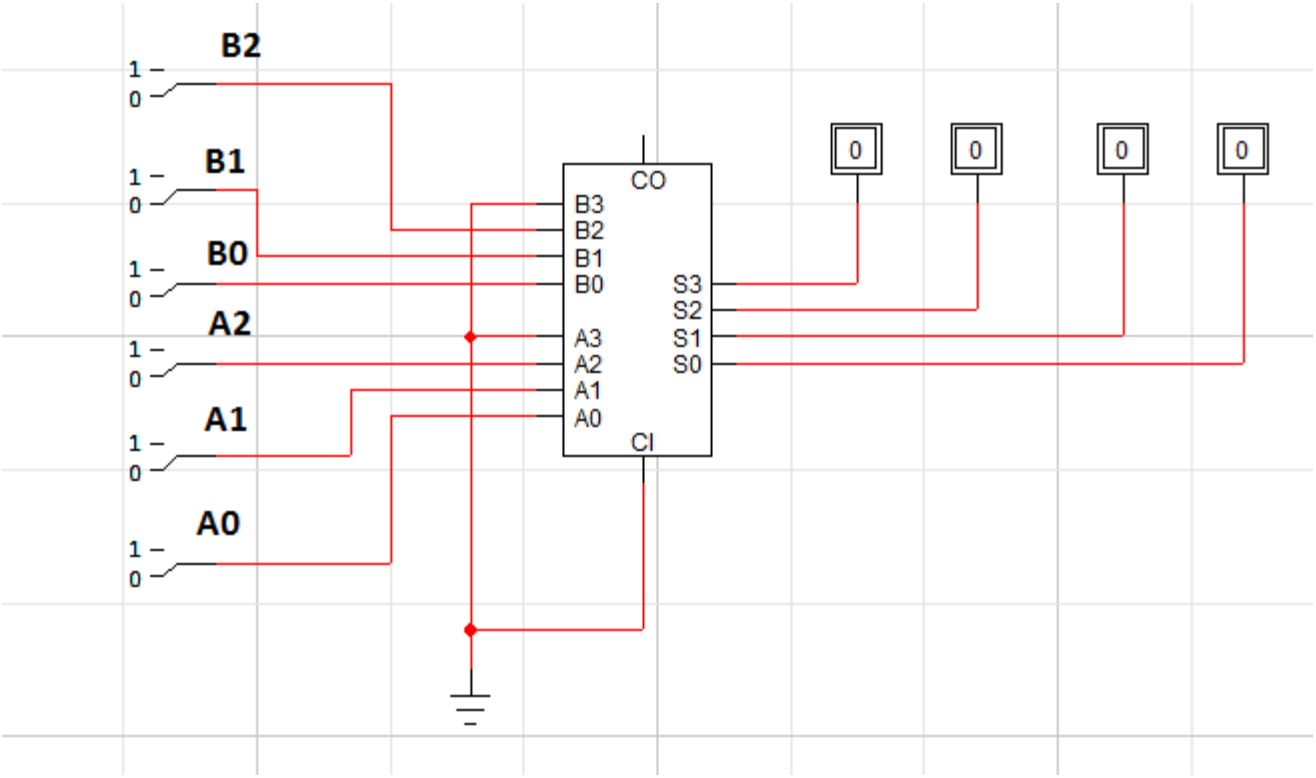
Solution # 2



Question # 3 **[LLO-4 - 15 - POINTS]**

Design the circuit on Logic Works that can perform addition of two numbers of 3bits.
First number A = A2A1A0
Second number B = B2B1B0

Solution # 3

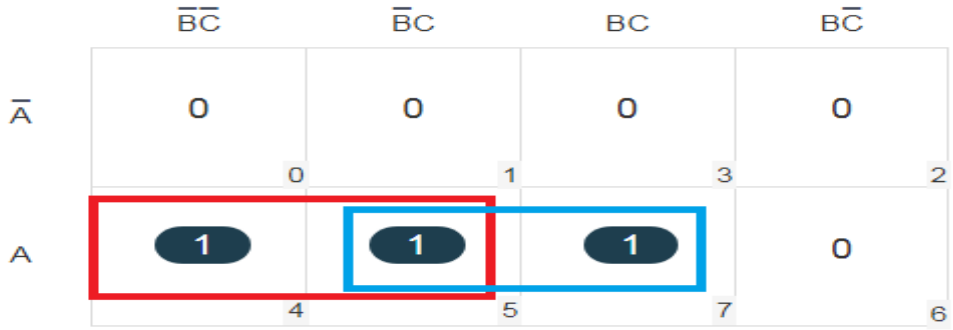


Question # 4 **[LLO-4 - 20 - POINTS]**

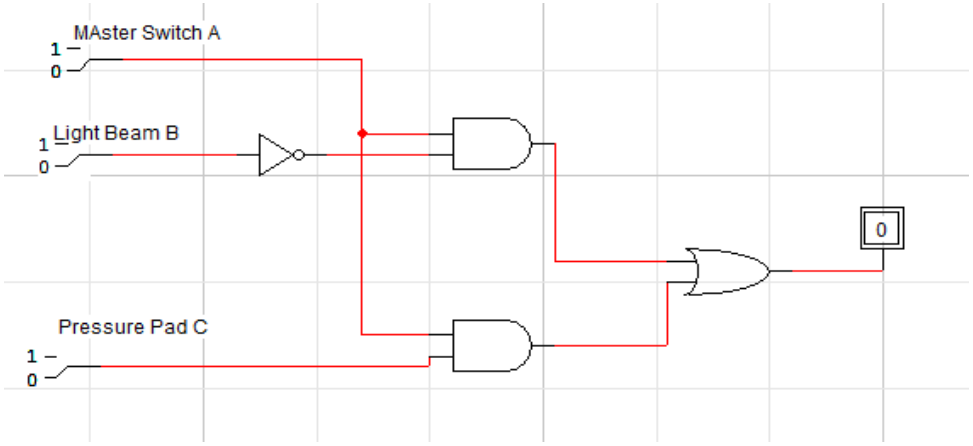
Design a burglar alarm for the house. The alarm system consists of master switch, light beam & pressure pad. The burglar alarm is to sound if a master switch is on and either a light beam is broken or pressure pad is stood on.
Master switch produces High logic when ON.
Light beam produces High logic when it is intact.
Pressure pad produces High logic when someone is stood on it.
Construct truth table and use K-map to get simplified Boolean expression. Construct the circuit diagram on Logic Works.

Solution # 4

Master Switch (A)	Light Beam (B)	Pressure Pad (C)	Output alarm X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1



X =



Thank you ☺