

Answer All Questions

Question 1.

- a) What are the main difference between OR and EOR gates ? Draw logic network , truth table and RLL for two cases : (3 Marks)


- b) Develop the logic network and RLL for Boolean equation :  $f = A.(B + \overline{C}) + \overline{B}$  (2 Marks)

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Question 2.

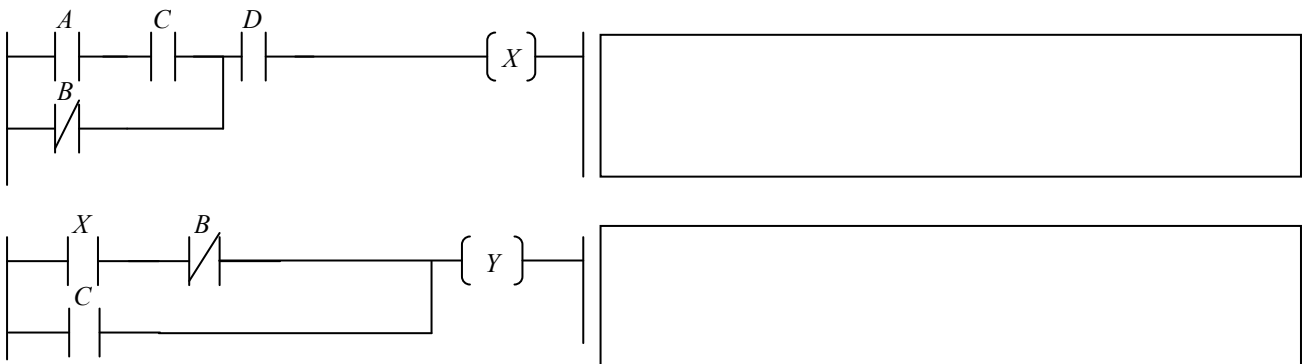
- a) Develop Relay Ladder Logic *RLL* program to move a crane forward and backward directions. The crane is driven manually using electric motor and two electromechanical relays (**F** and **B**). The RLL network will have the following controls: (5 Marks)
- **S1** and **S2** two push button switches to move forward and backward directions
  - Two output indicators (**G1**) and (**G2**), to show motor moving directions.
  - Two limit switches (**OT1**) and (**OT2**) to disable motor movements in two directions.

- Take into the consideration the control network in case of two push buttons **S1** and **S2** pushed together?

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b) Develop the Boolean equation from the following *RLLs* :

(2 Marks)



c) Simplify the Boolean equation :  $Z = ABCDF + \overline{A}BCDF + ABC\overline{D}F + ABC\overline{D}\overline{F}$

(1 Marks)

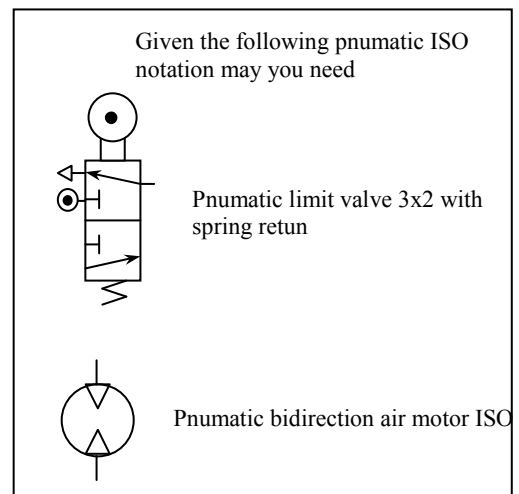
**King Saud University**  
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**Industrial Engineering Department**

Industrial Automation IE337 Mid-Term Examination 1

23/12/1434 - 27/10/2013 From 6:00PM to 7:15 PM

Question 3.

- a) Precision is important factor in machine automation. How to improve it? (1 Marks)
- b) What is the main difference between capacitive and inductive proximity sensor from application point view ? (1 Marks)
- c) Develop a pneumatic network circuit to move pneumatic motor clockwise and counterclockwise directions manually. The motor is driven using two pilot line valves (CW-Valve and CCW-valve). Given control material list : (5 Marks)
- Two push button valves 3x2 type with spring return to control motor directions (**CW-button and CCW-button**) .
  - Two pilot line valves 3x2 with spring return(CW-Valve and CCW-valve).
  - Two limit valves 3x2 with spring return (**OT1**) and (**OT2**) to disable motor movements in two directions.



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