

King Saud University
College of Engineering
Industrial Engineering Department

Industrial Automation IE337 Mid-Term Examination 1

9/5/1434 - 20/3/2013 From 6:00AM to 7:15 PM

Answer All Questions

Question 1.

Draw logic network , truth table and RLL for :

(3 Marks)

- a) RS memory.
- b) EOR gate.
- c) $F = A + A.B$

Question 2.

(4 Marks)

- a) Develop Relay Ladder Logic *RLL* program to move overhead crane carriage using an electric motor for having the following control options:
- Automatic cycle with two push bottoms for Start and Stop the electric motor using electromechanical relay.
 - Two indicators Green and Red, to shows the Start and Stop status.
 - Overload switch: to stop the motor running when overloaded.
 - One limit switch to stop the motor running in one direction in case of over travel conditions.

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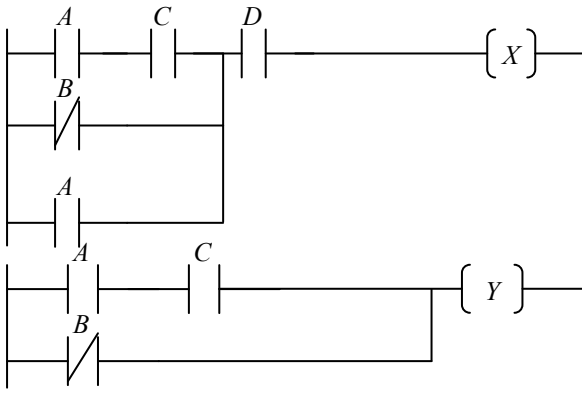
b) Develop the logic network and RLL for Boolean equation : $f = A.(B + \bar{C}) + \bar{B}.D$

(2 Marks)

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c) Develop the Boolean equation for the following *RLLs* :

(2 Marks)



d) Simplify the Boolean equation : $X = A + B(A + C\bar{B} + D\bar{A}C) + ABCD + B$

(2 Marks)

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e) Precision is important factor in machine automation, discuss how to improve the machine automation precision? (1 Marks)

f) What is the main difference between line power sensor and load power sensor? (1 Marks)

Question 3. (5 Marks)

Develop a pneumatic network circuit to run the following pneumatic machine sequence having:

- Two double acting cylinders **B** and **C**.
- Two limit valves 3x2 type with spring return at the front extreme sides (a^+ , and b^+).
- Two limit valves 3x2 type with spring return at the back extreme sides (a^- , and b^-), to be used to enable starting machine cycle?
- Start Push Button Valve 3x2 with spring return

$$[(START).b^-.c^-], \begin{pmatrix} B^+ \\ C^+ \end{pmatrix}, \begin{pmatrix} B^- \\ C^- \end{pmatrix}$$

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