



Industrial Electronics
Assignment

Question No 1. Multiple choice Questions

1. Does the severity of an electric shock increase or decrease with each of the following changes?
- a) A decrease in the source voltage
 - b) An increase in body current flow
 - c) A decrease in the length of time of exposure

Answer: Decreases.

2. State the piece of electrical safety equipment that should be used to perform each of the following tasks:
- a) A switching operation where there is a risk of injury to the eyes or face from an electric arc.

Answer: Face Shield

- b) Using a multimeter to verify the line voltage on a 3-phase 480 volt system.

Answer: Rubber Protective Equipment

- c) Opening a manually operated high-voltage disconnect switch.

Answer: Hot Sticks

3. In which industrial revolution the use of IT and Electronic systems further automated the production of industrial sector
- a) First
 - b) Second
 - c) Third
 - d) Fourth

Answer: Fourth industrial revolution.

4. Industrial safety is primarily a management activity which is concerned with _____, Controlling, Eliminating hazards from the industries.
- a) Reducing
 - b) Increasing
 - c) Suppressing

Answer: Reducing

5. The _____ is defined as the device which convert the one form of energy into another form of the energy.
- a) Sensor
 - b) Transducer
 - c) Resistor
 - d) Capacitor

Answer: Transducer



Industrial Electronics
Assignment

Question No 2

A. Draw digital logic circuit and ladder diagram that is equivalent to the following Boolean function that will initiate a motor "M" to start? (10) CLO-2

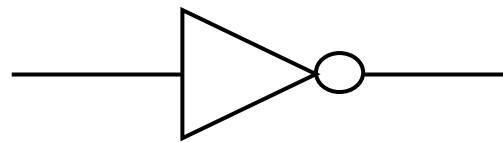
$$M = B' C D' + B' C E + B' C F'$$

Answer:

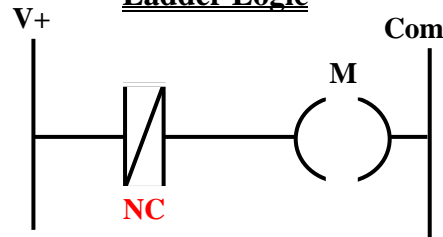
B' or D' or F'	M
0	1
1	0

NOT Operation:

Logic gate symbol



Ladder Logic

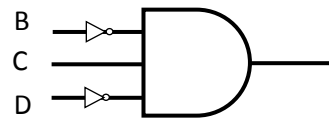


AND Operation:

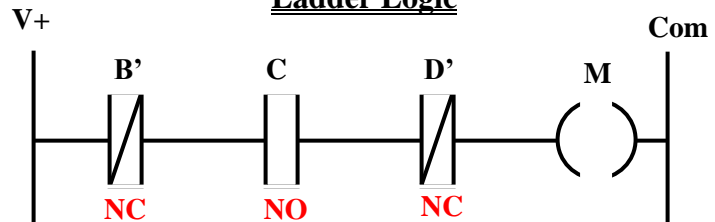
Boolean Function = B' C D'

B'	C	D'	M
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

Logic gate symbol



Ladder Logic



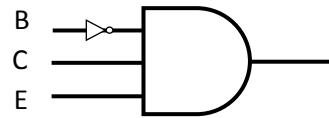


Industrial Electronics
Assingment

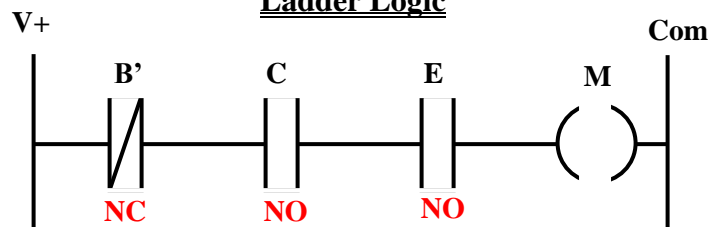
Boolean Function = $B'CE$

B'	C	E	M
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

Logic gate symbol



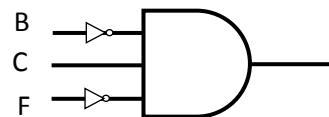
Ladder Logic



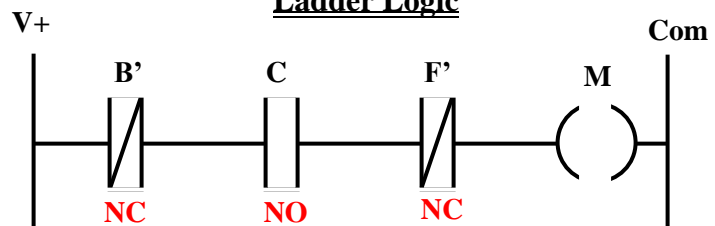
Boolean Function = $B'CF'$

B'	C	F'	M
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

Logic gate symbol



Ladder Logic



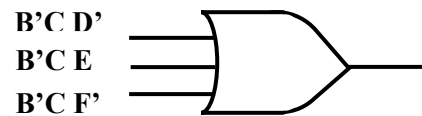


Industrial Electronics
Assignment

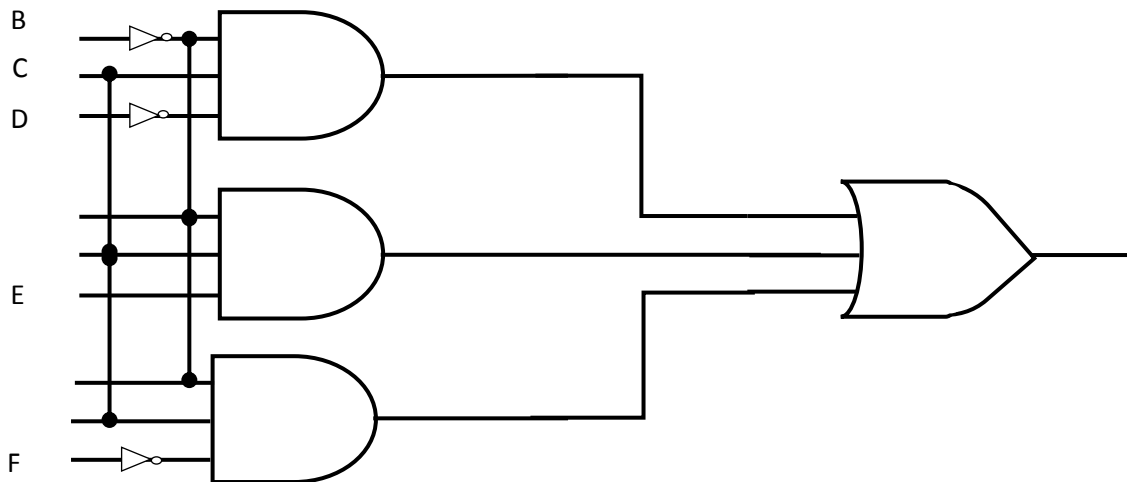
OR Operation

Boolean Function = $B'C D' + B' C E + B' C F'$

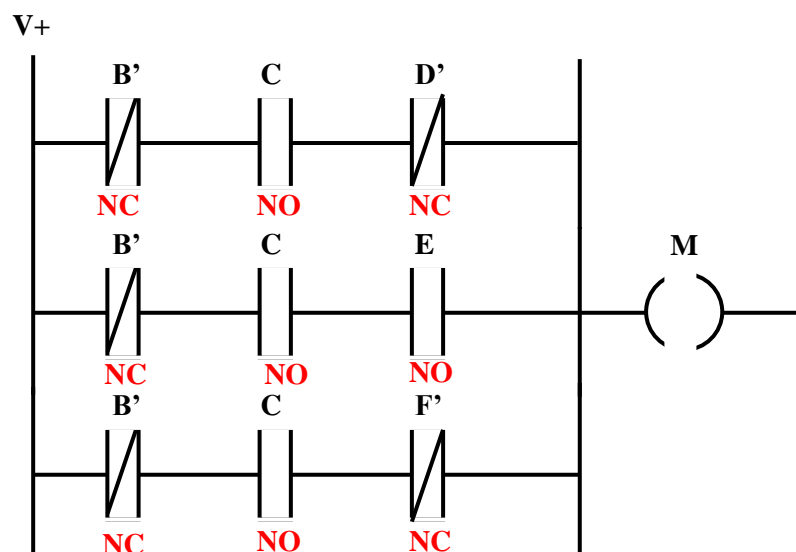
$B' C D'$	$B' C E$	$B' C F'$	M
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1



Boolean Function Logic Diagram:



Ladder Logic:

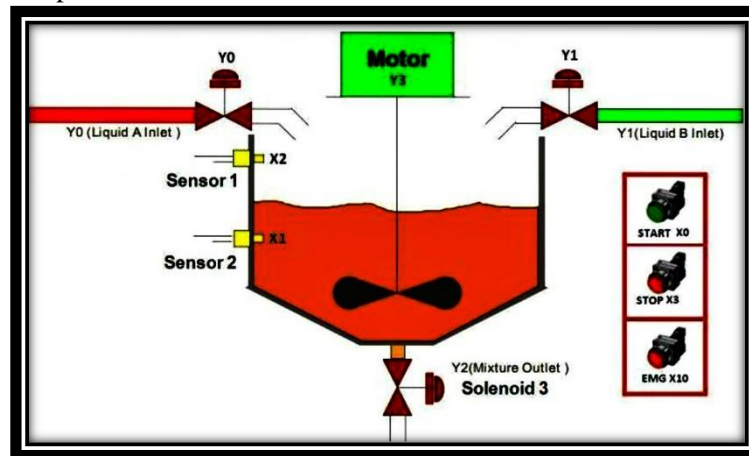




Industrial Electronics
Assignment

Question No 3

- A. Describe and draw ladder diagram for the below given process having a container infused with liquids A and B in order when START is pressed. When it reaches the set level, mix the two liquids evenly then open the valve to let out the mixture? **CLO-2**



Ladder Program Description:

- When START button pressed “X0” will turn ON and latched, and the valve will open and because of it liquid “A” will start infusing, and when it will reach to low level then the low level float sensor will operate.
- When the liquid will reach to low level float sensor, “X1” and “Y1” will turn ON. And Y1 will be latched then the liquid “B” valve will open and start filling, as the level will increase, the high level float sensor will operate.
- When the level will reach to the high level float sensor, “X2” will turn ON and “Y3” will also turn ON and will activate the agitator, and the “T0” timer will start counting for 60 seconds. After 60 seconds timer will turn ON and “Y3” agitator motor will stop and “Y2” will turn ON and will latch and the mixture will be start flowing through the container.
- When “Y2” will turn ON, the T1 timer will start counting for 120 seconds. After 120 seconds “T1” will turn ON and “Y2” will stop and the mixture will stop flowing through container.
- When the error occurs press EMERGENCY STOP button “X10”. “X10” will turn ON and will disable all the outputs and it will stop the whole system.

Required Number of PLC Inputs:

- X1 – Start Switch
- X1 – Low level float sensor. X1 = ON when the liquid level reaches X1.
- X2 – High level float sensor. X2 = ON when the liquid level reaches X2.
- X3 – Stop Switch.
- X10 – EMERGENCY STOP button. X10 = ON when the button is pressed.



Industrial Electronics
Assignment

Required Number of PLC Outputs:

- Y0 – Liquid A Inlet
- Y1 – Liquid B Inlet
- Y2 – Mixture Outlet
- Y3 – Agitator / Stirrer

Required Number of PLC Timer:

- T0 – 60 seconds Timer, 100ms Time Base (See K600 Preset Value for Timer)
- T1 – 120 seconds Timer, 100ms Time Base (See K1200 Preset Value for Timer)

Ladder Diagram:

