



Department of Electrical Engineering

Subject: Industrial Electronics

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ID: 13045

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Date: _____

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Name: M. Numan Asad

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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) An increase in body resistance.
- (d) A decrease in the length of time of exposure.

(2) State the piece of electrical safety equipment that should be used to perform each of the following task.

- (a) A switching operation where there is a risk of injury to the eyes or face from an electric arc.
- (b) using a multimeter to verify the line voltage on a 3-phase 480 volt system.
- (c) opening a manually operated high-voltage disconnect switch.

(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



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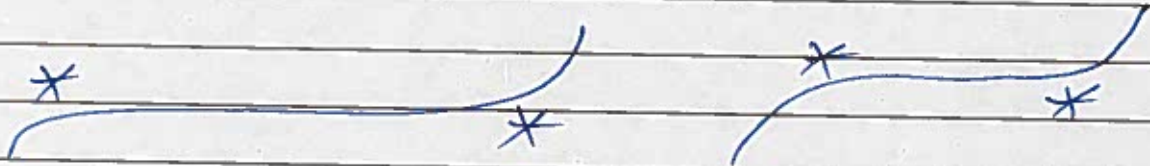
I.D: 13045

(4) Industrial safety is primarily a management activity which is ~~con~~ concerned with Increasing controlling.

- (a) Reducing ✓
- (b) Increasing
- (c) suppressing

The Transduce is defined as the device which convert the one form of energy into another form of the energy

- (a) sensor
- (b) Transduce ✓
- (c) Resistor
- (d) capacitor



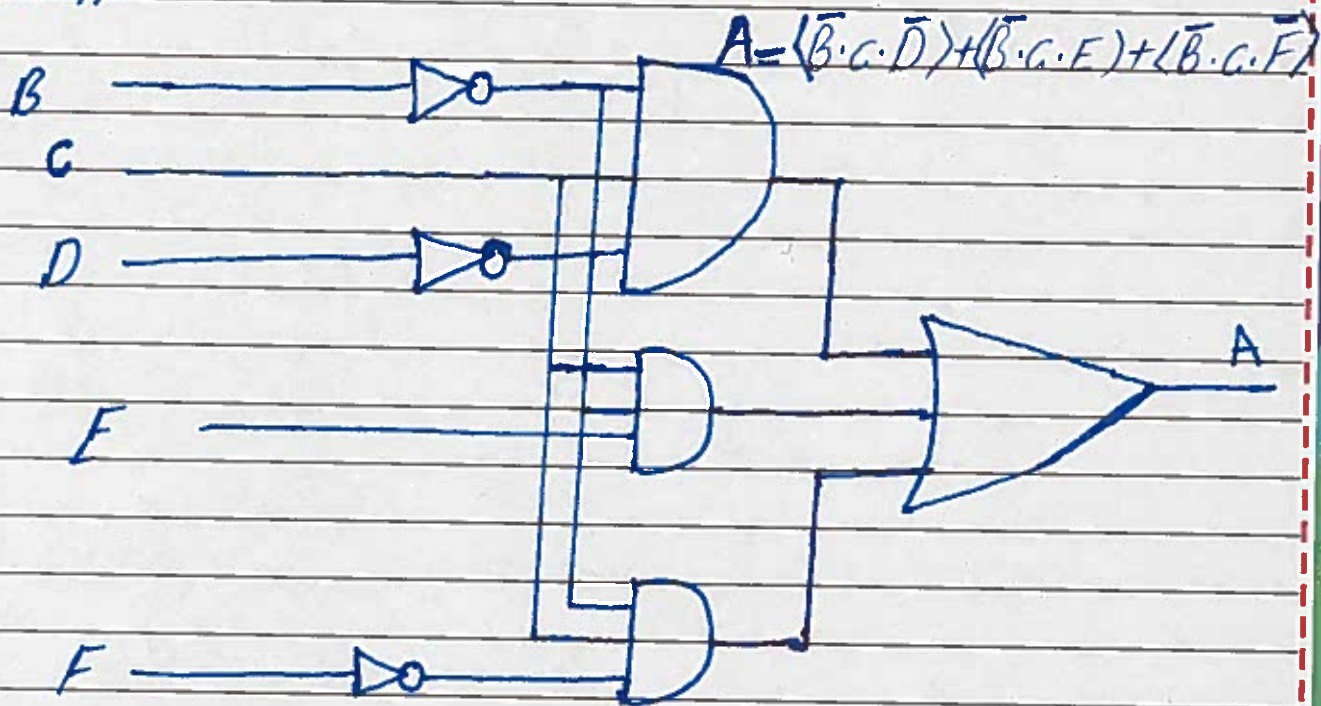


Question No: 2

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

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

Solution:

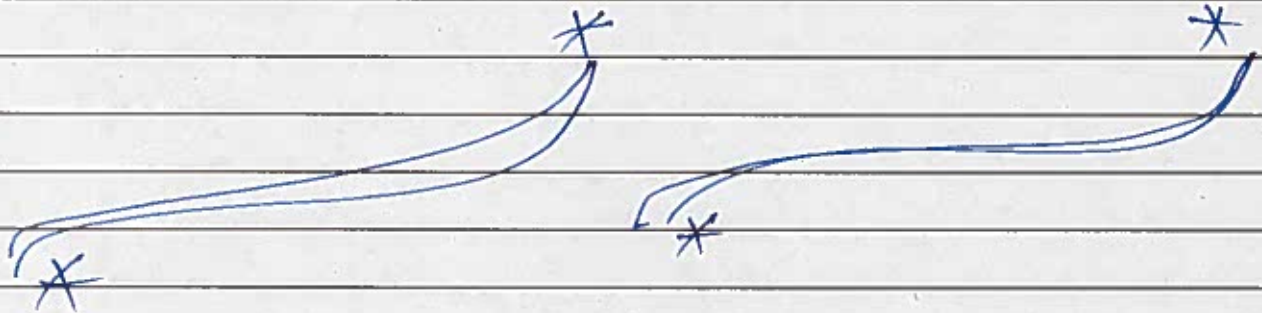
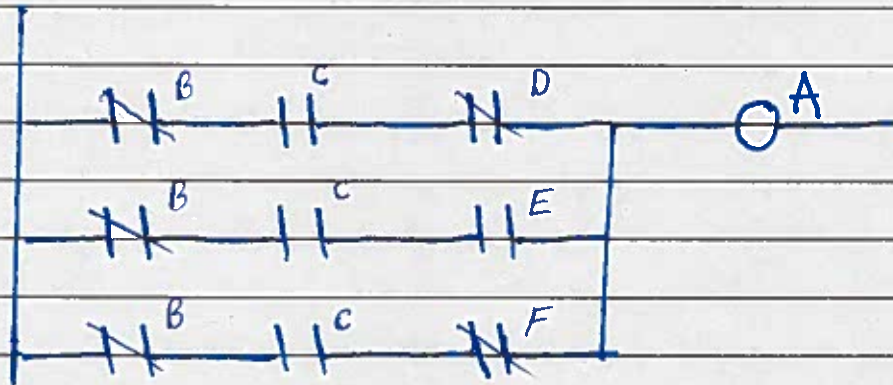


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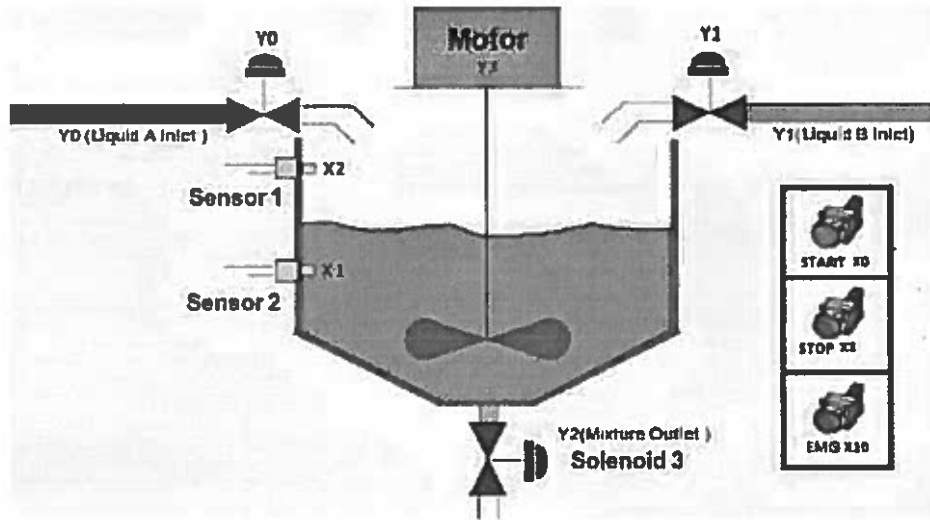


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A. Describe and draw ladder diagram for the below given process having a container infused with liquids A and B in order when START is pressed. When it reaches the set level, mix the two liquids evenly then open the valve to let out the mixture? CLO-2



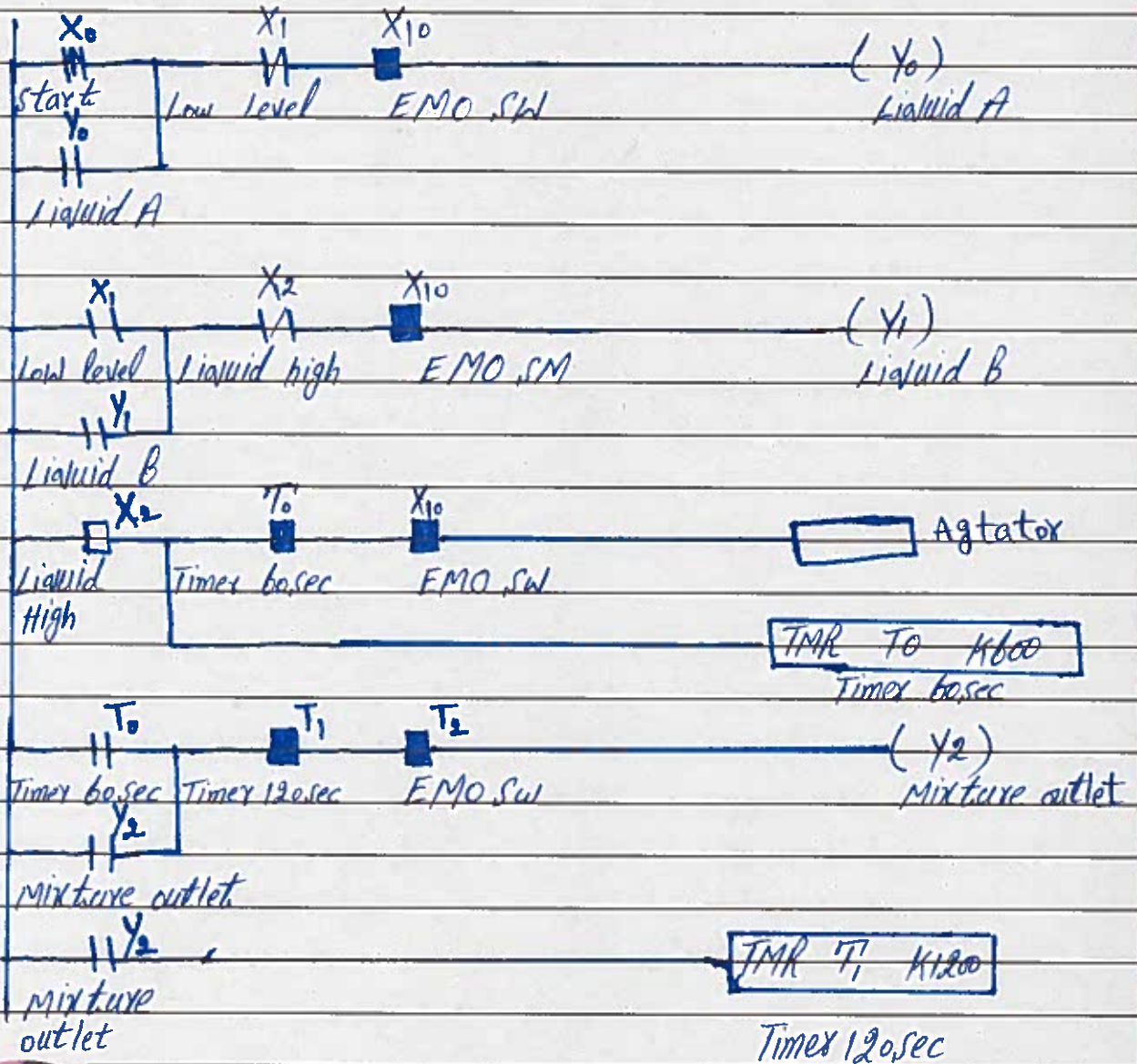
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Solution:



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Number of PLC Input Required:

X_1 - start switch

X_1 - Low level float sensor. $X_1 = ON$ when the liquid level reaches X_1 .

X_2 - High level float sensor. $X_2 = ON$ when the liquid level reaches X_2 .

X_3 - stop switch

X_{10} - Emergency stop button. $X_{10} = ON$ when the button is pressed

Number of PLC output Required:

Y_0 Liquid A inlet

Y_1 liquid B inlet

Y_2 Mixture outlet

Y_3 Agitator / stirrer



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⇒ Number of PLC Timer Required:

T₀ - 60sec Timer 100ms Timer Base (see K60 preset value for Timer)

T₁ - 120sec Timer 100ms Timer Base (see K1200 preset val for Timer)

⇒ Ladder Program Description:

X₀ = ON when start is pressed Y₀ will be ON and latched and the valve will be opened for infusing liquid A until the level reaches the low level float sensor.

X₁ = ON when the level reaches the low-level float sensor. Y₁ will be ON and latched and the valve will be opened for infusing liquid B until the level reaches the high-level float sensor.



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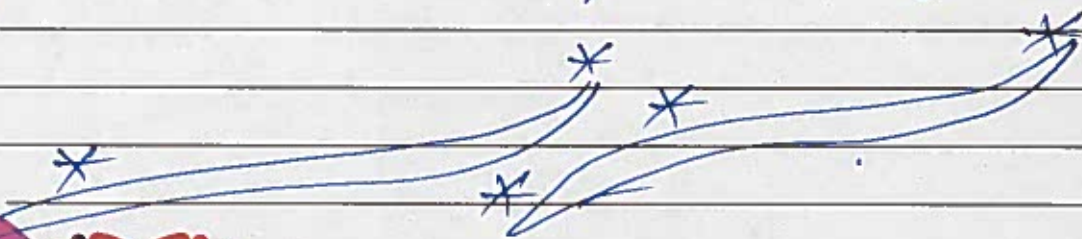


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- X_2 = on when the level reaches the high-level float sensor. Y_3 will be on and activates the agitator. Also timer T_0 will start to count for 60 sec. After 60 sec. T_0 will be on and the agitator motor Y_3 will stop working. Y_2 will be on and latched and the mixture will drain out of the container.
- When Y_2 = on timer T_1 will start to count for 120 sec. After 120 sec T_1 will be on and Y_2 will be off. The draining process will be stopped.
- When an error occurs press Emergency stop button X_{10} . The plc contact X_{10} will be on to disable all the output. The system will then stop running.



The End