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SUBJECT Industrial Electronics

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Q1: Multiple choice questions.

- (1) Does the severity of an electric shock increase or decrease with each of the following changes Decrease in length of time of exposure
- (2) State the piece of electrical safety equipment that should be used to perform each of the following task Opening a manually operated high voltage disconnect switch.
(a) glasses, Face Mask (b) gloves (c) gloves, hat
- (3) In which industrial revolution the use of IT and Electronic systems further automated the production of Industrial Sector ~~Third~~ Fourth.
- (4) Industrial safety is primarily a management activity which is concerned with Reducing controlling eliminating hazards from the industries.
- (5) The Transducer is defined as the device which convert the one form of energy into another form of the energy.

P.T.O

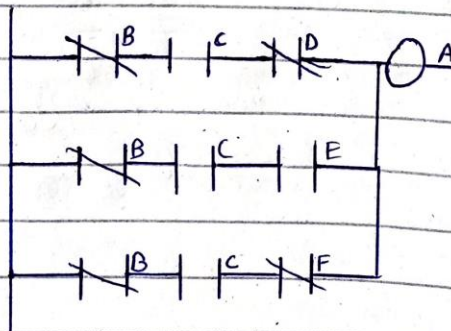
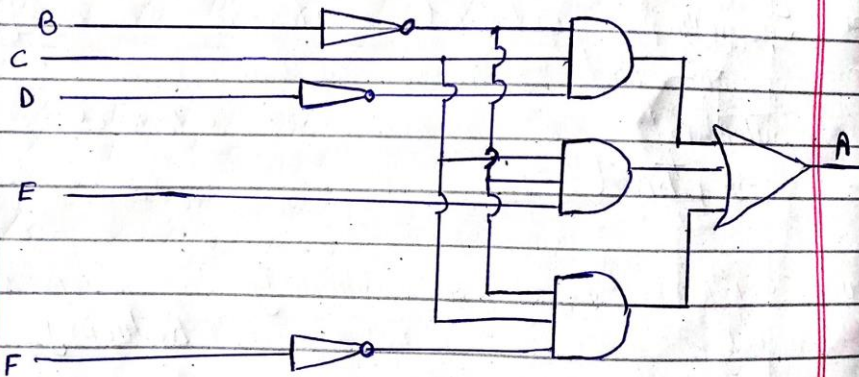
Q2: Draw digital logic circuit and ladder diagram that is equivalent to the following Boolean function that will initiate a motor "M" to start?

$$M = B'CD' + B'CE + B'CF$$

Ans:

We have.

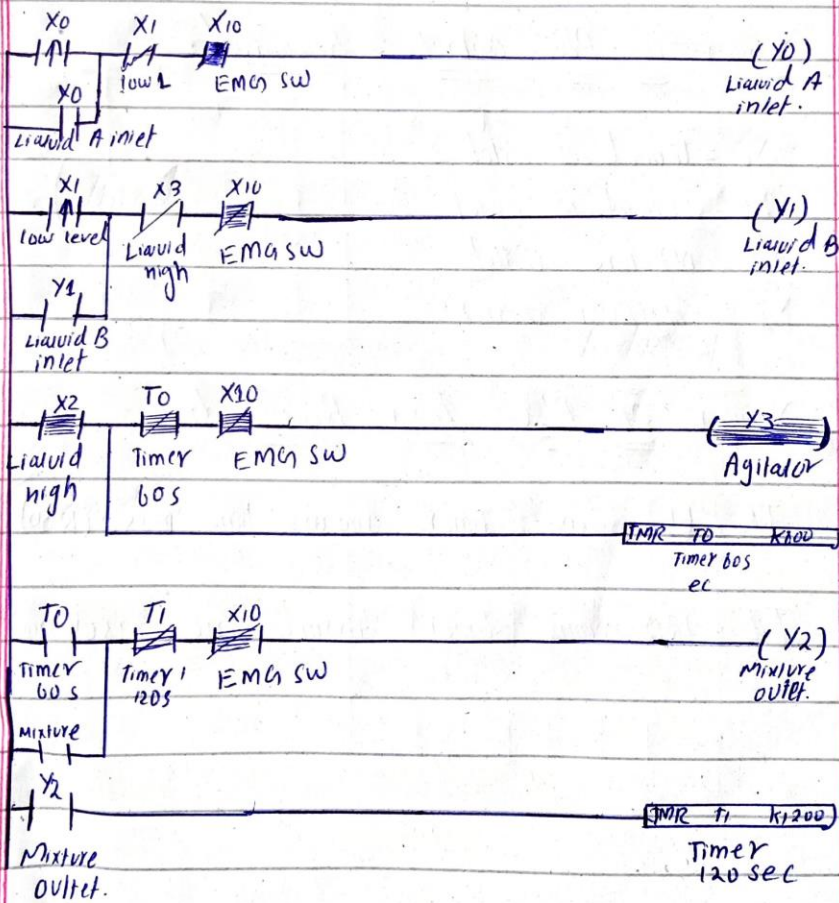
$$M = (\bar{B} \cdot C \cdot \bar{D}) + (\bar{B} \cdot C \cdot E) + (\bar{B} \cdot C \cdot \bar{F})$$



Q3. Describe and draw ladder diagram for the below given process having a container infused with liquid A and B in order when start is pressed. When it reaches the set level mix the two liquids evenly the open the valve to let out the mixture?

Answer:

Ladder Diagram



Number of PLC inputs Required:

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

Number of PLC Outputs Required:

Y₀ - liquid A inlet

Y₁ - liquid B inlet

Y₂ - Mixture outlet

Y₃ - Agitator/stirrer

Number of PLC Timer Required:

T₀ - 60 second Timer, 100ms time Base (K100)

T₁ - 120 second Timer, 100ms time Base (K120)

Ladder Program Description:

- $X_0 = ON$, when start is pressed Y_0 will be ON and latched, and the valve will be opened for infusing liquid A until the level reaches the low level float sensor.
- $X_1 = ON$, when the level reaches the low level float sensor. Y_1 will be ON and latched, and the valve will be opened for infusing liquid B until the level reaches the high level float sensor.
- $X_2 = ON$ when the level reaches the ~~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_2 will start to count for 120 sec. After 120 sec, T_2 will be ON and Y_2 will be OFF. The draining process will be stopped.

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When an error occurs, press Emergency stop button X10. The NC contact X10 will be ON to disable all the outputs. The system will then stop running.

