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Assignment: Industrial Electronics

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GQRA NATIONAL

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Question # 01 Multiple Choice Question

1) Does the severity of an electric shock increase or decrease with each of the following changes?

d. A decrease in the length of time of exposure.

2) State the peice of electrical safety equipment that should be used to perform each of the following tasks:

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

3) In which industrial revolution the rise of IT and electronic systems further automated the production of industrial sector.

c. Third

4) Industrial safety is primarily a management activity which is concerned with Reducing, Controlling, Eliminating hazards from the industries.

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5) The Transducers is defined as the device which convert the one form of energy into another form of energy.

b) Transducers

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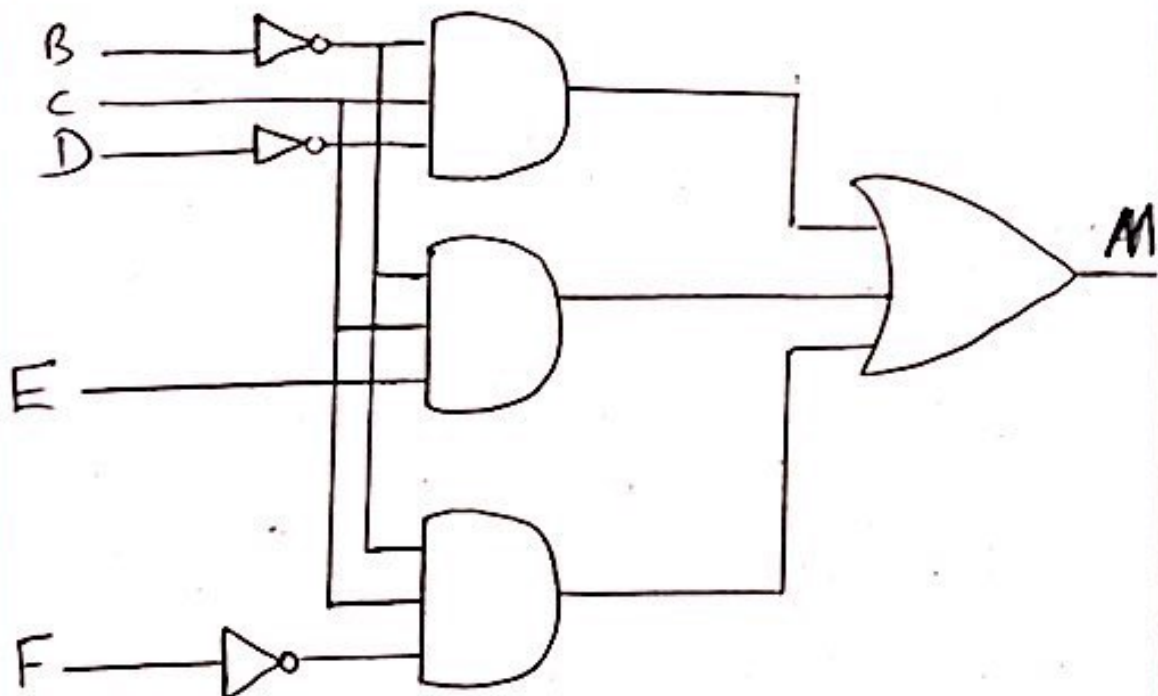
Question no # 02

Draw the digital logic circuit and ladder diagram i.e. equivalent to the following Boolean function that will initiate a motor 'M' to start.

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

Ans:- Digital Logic Circuit:-

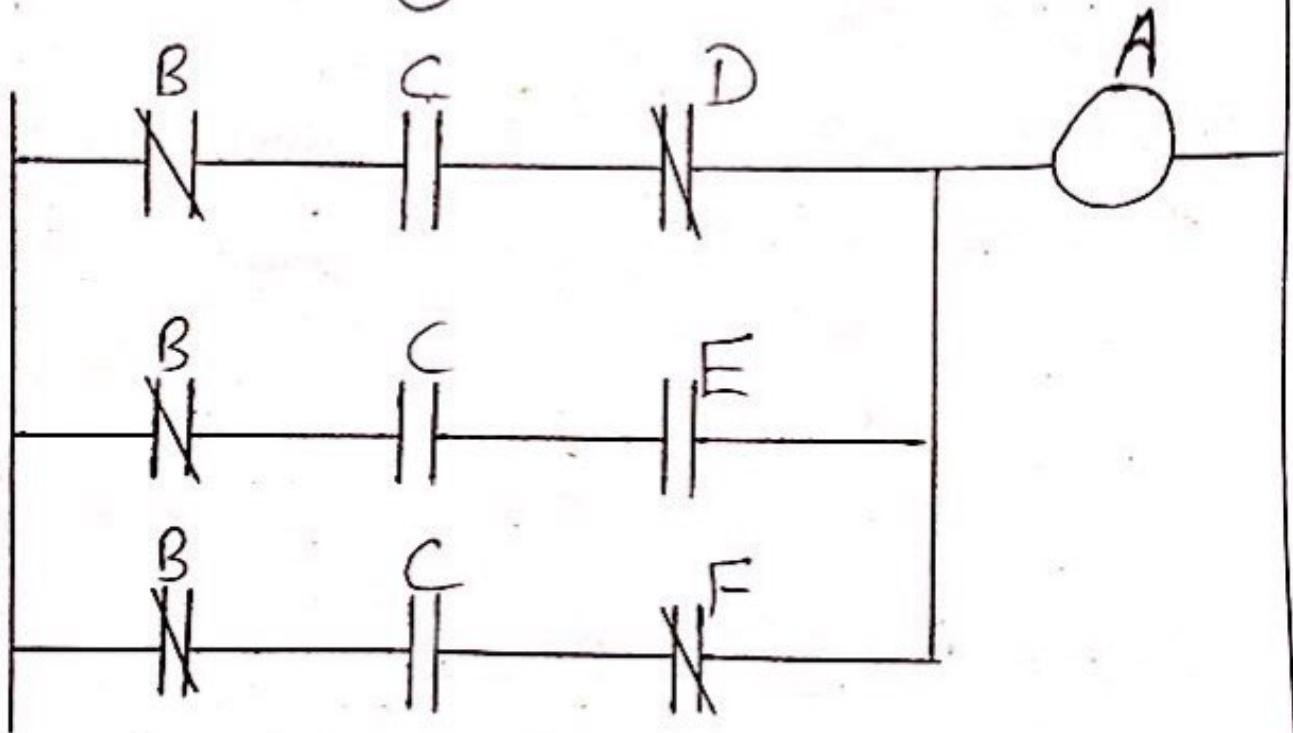
For $M = B'CD' + B'CE + B'CF'$



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Ladder Diagram



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Question #03-

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 upon the valve to let out the mixture.

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Ladder programme 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.
- $X2 = ON$ when the level reaches the high-level float sensor. $Y3$ will be ON and activates the agitator. Also, timer $T0$ will start to count for 60 sec. After 60 sec, $T0$ will be ON, and the agitator motor $Y3$ will stop working. $Y2$ will be ON and latched, and the mixture will drain out of the container.

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- When $Y2 = ON$, timer $T1$ will start to count for 120 sec. After 120 sec, $T1$ will be ON and $Y2$ will be OFF. The draining process will be stopped.
- 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.

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.

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Numbers of PLC outputs Required-

Y0 - Liquid A Inlet

Y1 - Liquid B Inlet

Y2 - Mixture Outlet

Y3 - Agitator / stirrer

Numbers of PLC Times required-

T0 - 60 second Times, 100ms time
Base. (K 60 preset value for times)

T1 - 120 second Times, 100ms

Time Base (K 1200 preset value for
times)

