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Subject: Industrial Electronics

Mid Assignment

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Q#01 MCA's

- (1) Does the severity of an electric shock increase or decrease with each of the following changes.
- (a) decrease                      (c) decrease  
(b) increase                      (d) decrease
- (2) State the piece of electric safety equipment that should be used to perform each of the following task.
- (a) face shield.                      (c) safety goggles  
(b) safety gloves
- (3) In which industrial revolution the use of IT and electronic systems further automated the production of industrial sector.

Ans (c) Third

- (4) Industrial safety is primarily a management activity which is concerned with Reducing controlling, eliminating hazards from the industries.

Ans (a) Reducing

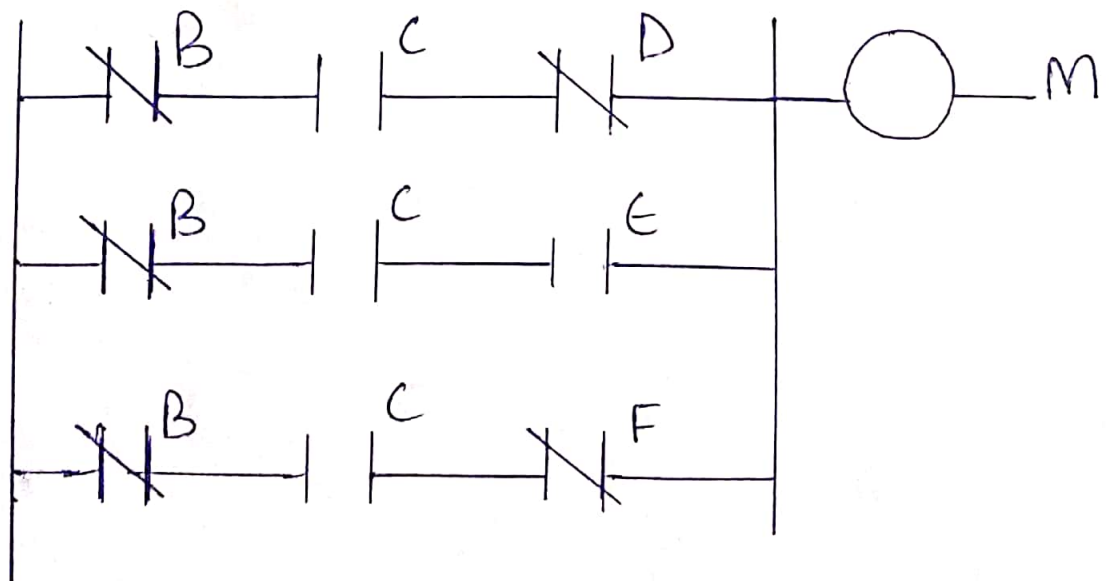
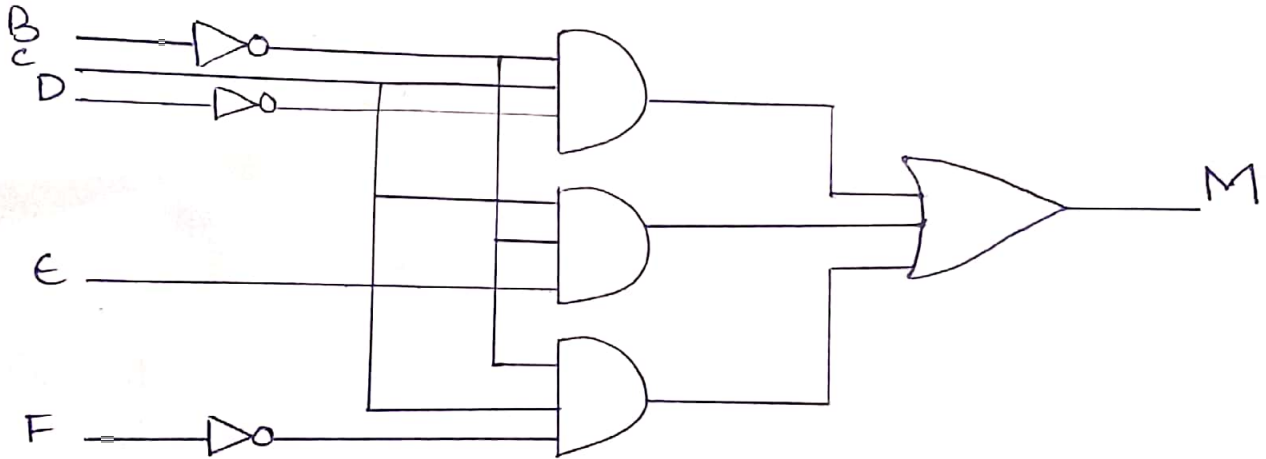
- (5) The Transducer is defined as the device which convert one form of energy into another form of energy.

Ans (b) Transducer

Q#02

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

$$M = \bar{B}C\bar{D} + \bar{B}CE + \bar{B}C\bar{F}$$



Q#03

Answer:

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 Time Required:

T0 - 60 second Timer, 100 ms time base.

T1 - 120 second Timer 100 ms time base.

## 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 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 NC contact  $X_{10}$  will be ON to disable all the outputs. The system will then stop running.

