DEPARTMENT OF MECHANICAL ENGINEERING

AUTOMATION LAB -402172L1

STANDARD OPERATING PROCEDURE

Name of the Lab./facility	**AUTOMATION LAB**
Purpose	To train the students in hydraulic and pneumatic circuit design using different control devices
Scope	To Understand principles, strategies and advantages of industrial automation. Application of PLC to design a system.
Responsibility	Faculty Incharge, HOD/MECH

STANDARD OPERATING PROCEDURE FOR WATER LEVEL CONTROL USING PLC

PROCEDURE:

1. Load the logo software to the PC
2. Open the logo software
3. Switch On the PLC trainer
4. Connect PLC with level control kit.
5. Open the New folder and draw the ladder logic program
6. Select the correct hardware configuration.
7. Store the Program to PLC
8. Run the program
9. Verify the performance of the water level control using PLC.

PRECAUTIONS TO BE FOLLOWED

- Ensure sufficient water is there in the tank.
- Check the experimental setup for leaks.

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

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DESIGN OF CIRCUITS WITH LOGICAL SEQUENCE (AND GATE) USING ELECTRO PNEUMATIC TRAINER KITS

1. Draw the circuit diagram.
2. Connect the compressor air supply to FRL unit.
3. Any two of the outputs of FRL unit directly connected to **3/2 push button valve** inlet first and second.
4. Both 3/2 push button valves outputs to give **AND Gate input.**
5. Check the all circuit connections are complete without any loose ends
6. Open the hand slide valve. The air passes in both 3/2 pushbutton valves input port.
7. When both push buttons is pressed then cylinder should be activated.

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DESIGN OF CIRCUITS WITH LOGICAL SEQUENCE (OR GATE) USING ELECTRO PNEUMATIC TRAINER KITS

1. Draw the circuit diagram.
2. Connect the compressor air supply to FRL unit.
3. Any two of the outputs of FRL unit directly connected to **3/2 push button valve** inlet first and second 3/2 push button valve inlet.
4. Both 3/2 push button valves outputs to give the valve inlet ports
5. Check the all circuit connections are complete without any loose ends
6. Open the hand slide valve. The air passes in both 3/2 pushbutton valves input port.
7. When any one push buttons is pressed then cylinder should be activated.

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AUTOMATION OF MULTIPLE CYLINDERS IN SEQUENCE (A+B+B-A-) USING PLC

1. Connect the FRL unit, Control valves, directional control valves and cylinders as shown in the circuit.
2. Draw the functional block diagram using PLC software and save it in the computer.
3. Give connections between PLC and PC using USB port and download the program to the PLC.
4. Give connections from the reed switches to the PLC input and from the PLC output to the respective solenoid valves.
5. Adjust the FRL and set the pressure as 6 bars.
6. Switch on the electric supply.
7. Execute the program from the PLC and observe the sequencing of cylinders being carried out automatically.

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ACTUATION OF HYDRAULIC CYLINDER TO FIND OUT FORCE Vs PRESSURE

1. Switch on the electrical power supply with motor.
2. Switch on the power supply to the control unit.
3. Open the lab view software in the system.
4. Inter face hydraulic trainer with system using RS-232.
5. Open the force. Go to operate, click the run. Than power on (below).
6. Now extend the system by pressing the up button.
7. Load cell indicate the force value in the monitor.
8. Now adjust the pressure regulator and set the maximum pressure as 25kg/cm2.
9. Retract the cylinder.
10. Once again forward the cylinder; you have adjusted the pressure in pressure regulator.
11. You have seen the force value in monitoring.
12. Repeat the force value for different pressure.

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ACTUATION OF HYDRAULIC CYLINDER TO FIND OUT SPEED VS DISCHARGE

1. Switch on the electrical power supply with motor.
2. Switch on the power supply to the control unit.
3. Open the lab view software in the system.
4. Inter face hydraulic trainer with system using RS-232.
5. Open the speed. Go to operate, click the run then power on (below).
6. Now extend the system by pressing the up button.
7. Now regulate the flow control valve, contract the system by pressing down position after seen monitor in velocity cm/sec.
8. Now adjust the flow control valves and set the maximum flow, to find the up and velocity.
9. Repeat the velocity values for different flows

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SIMULATION OF SINGLE ACTING CYLINDER BY USING

AUTOMATION SOFTWARE

1. Open the file automation software and open a new file.
2. Then the select the required circuit using the library tool bar.
3. Then pick the required cylinder and valves required.
4. Then drag it and place it is the file.
5. Then give the connections as given in the circuit.
6. Then save the circuit and then select the simulation option.

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SIMULATION OF DOUBLE ACTING CYLINDER BY USING

AUTOMATION SOFTWARE

1. Open the file automation software and open a new file.
2. Then the select the required circuit using the library tool bar.
3. Then pick the required cylinder and valves required.
4. Then drag it and place it is the file.
5. Then give the connections as given in the circuit.
6. Then save the circuit and then select the simulation option.

RECORD TO BE MAINTAINED

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HOD