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| **Course Name:** | **Virtual Instrumentation and Automation lab** | **Semester:** | **V** |
| **Date of Performance:** | **30/10/2021** | **Batch No:** | **B1** |
| **Faculty Name:** | **Prof.** | **Roll No:** | **1912052** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** |  |

**Experiment No: 7**

**Title: Simulation of logic gates (AND , OR) , Applications of shuttle and shut off valve**

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| **Aim and Objective of the Experiment:** |
| Simulation of Single and double acting cylinder in Pneumatic system |

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| **COs to be achieved:** |
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| **Theory:**  Pneumatic systems used in industry are commonly powered by compressed air or compressed inert gases. A centrally located and electrically-powered compressor powers cylinders, air motors, pneumatic actuators, and other pneumatic devices. A pneumatic system controlled through manual or automatic solenoid valves is selected when it provides a lower cost, more flexible, or safer alternative to electric motors, and hydraulic actuators.  Pneumatic systems in fixed installations, such as factories, use compressed air because a sustainable supply can be made by compressing atmospheric air. The air usually has moisture removed, and a small quantity of oil is added at the compressor to prevent corrosion and lubricate mechanical components.  Factory-plumbed pneumatic-power users need not worry about poisonous leakage, as the gas is usually just air. Smaller or stand-alone systems can use other compressed gases that present an asphyxiation hazard, such as nitrogen—often referred to as OFN (oxygen-free nitrogen) when supplied in cylinders.  Any compressed gas other than air is an asphyxiation hazard—including nitrogen, which makes up 78% of air. Compressed oxygen (approx. 21% of air) would not asphyxiate, but is not used in pneumatically-powered devices because it is a fire hazard, more expensive, and offers no performance advantage over air.  Portable pneumatic tools and small vehicles, such as Robot Wars machines and other hobbyist applications are often powered by compressed carbon dioxide, because containers designed to hold it such as soda stream canisters and fire extinguishers are readily available, and the phase change between liquid and gas makes it possible to obtain a larger volume of compressed gas from a lighter container than compressed air requires. Carbon dioxide is an asphyxiant and can be a freezing hazard if vented improperly. |

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| **Circuit Diagram/ Block Diagram:** |
| AND Gate  Parts (Bottom to up) :  1.Air Compressor  2. Air Service unit  3. 3/2 Directional Valve  4. Flow control valve(Forward and reverse path)  5. Single acting cylinder  6. Shut off valve      OR Gate |

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| **Post Lab Subjective/Objective type Questions:**  **Give application and details of following valves :**   1. **Shuttle Valve** 2. **Two Pressure Valve** |
| **Conclusion:**   * There are mainly two applications of AND gate as Enable gate and Inhibit gate. Enable gate means allowance of data through a channel and Inhibit gate is just the reverse of that process i.e. disallowance of data through a channel. * The most common application of OR gate is an intrusion detection and an alarm system. The system can be used in a home, office, etc. The sensors of the alarm detection system produce a HIGH voltage when open and a LOW voltage when closed. * A shuttle valve provides brake control in pneumatic winch applications and by using the shuttle valve, more than one switch can be operated on a single machine for safety. * Shut off valves are designed to safely manage compressed air in pneumatic applications, and are used to block compressed air in an industrial automation process, and isolate sub-systems when not in use. |

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| **Signature of faculty in-charge with Date:** |