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| **Ref.** | **Unit 6 Concepts & Definitions** | **Terms, Notation, Formulas, Diagrams** |
|  | Processes involving batch and continuous flow of liquids, gasses, and bulk solids. | Process Automation |
|  | Processes usually involving the piece flow of product. | Factory Automation |
|  | A system that combines measuring materials and controlling instruments into an arrangement capable of automatic action. |  |
|  | Using \_\_\_\_\_\_\_\_\_\_\_\_ an operator must visually monitor a process and make corrections as needed. |  |
|  | Using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ instruments are used to measure and control a process. |  |
|  | Process of utilizing instruments to measure and control process variables to manufacture products safely and efficiently. |  |
|  | Federal agency that enforces safety and health regulations. |  |
|  | The \_\_\_\_\_\_\_\_ develops measurement standards. |  |
|  | Parameters or quantities that we **wish to control at the correct limit**…must be maintained (measured and controlled) in a loop. (e.g. the fluid level in a tank, temperature, pressure…) |  |
|  | The quantity of fluid passing a certain point within a given period of time. A common unit is gallons per minute (GPM). |  |
|  | The amount of heat in a substance; usually measured in degrees Fahrenheit (o F) or Celsius (o C). |  |
|  | The height of material in a container. Typically measured in feet, inches or percent. |  |
|  | Force divided by the area that the force is acting on. Common unit of measure of pressure is pounds per square inch or PSI. |  |
|  | The desired value of a process variable (e.g. fluid level). Value at which PV is maintained. |  |
|  | When the process variable deviates from the set point. |  |
|  | The amount of deviation from the set point. |  |
|  | The difference between the minimum and maximum values of a process variable. |  |
|  | The difference between the maximum and minimum values of a range |  |
|  | The ability of a sensor to provide the same result under the same conditions. |  |
|  | The smallest change in a variable that can be detected by a sensor. |  |
|  | The gradual change in a measurement over time when the process conditions are constant. |  |
|  | The degree to which a measured value matches the actual process value. |  |
|  | The milliamp signal (value) and the corresponding value of the process variable are \_\_\_\_\_\_\_\_\_\_\_\_ to one another. |  |
|  | The arrangement of instruments designed to measure and control a process. |  |
|  | A typical **control loop** contains 3 major elements: |  |
|  | The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is typically an electrical device (e.g. a level measuring instrument) that **measures the process variable** and converts the measurement into a value (electrical signal). |  |
|  | The most common electrical transmission in a control loop is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ milliamps. |  |
|  | The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ receives the 4-20 mA signal from the primary element (PV), compares it to a set point, and **sends a signal (corrective action) to the final element to keep the process variable at the set point**. |  |
|  | In order to maintain (control) the process variable set point (e.g. the level in a tank), a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be **changed to control the final element** (e.g. an actuator controlled valve). |  |
|  | Receives a signal from the control element and adjusts the manipulated variable in order to keep the process set point. |  |
|  | In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the final control element is either on or off depending on whether the process variable is above or below set point. (tends to overshoot or undershoot the set point) |  |
|  | In \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the final control element changes proportionally to the amount of deviation from the setpoint. (more precise) |  |
|  | Ensures that the output of the transmitter is proportional to the Process Variable. |  |
|  | Lists instruments used by tag number. |  |
|  | Contain applicable codes, standards, wiring and cable requirements, ventilation requirements, power supply requirements, etc. |  |
|  | Provide information and requirements for proper mounting and connections of a specific instrument. |  |
|  | Identify where an instrument is to be installed. |  |
|  | Detailed drawing of equipment, piping, and instrumentation on a project. |  |
|  | P&ID symbol for a discrete, field mounted instrument, visible at field location… |  |
|  | P&ID symbol for a ball valve. |  |
|  | P&ID symbol for a control valve. (Fail to closed position) |  |
|  | Identify instrumentation location, function, and related instrument loop. |  |
|  | Identify location of instrument, when the process is spread across multiple buildings or areas. |  |