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| **Ref.** | **Unit 5 Concepts & Definitions** | **Terms, Notation, Formulas, Diagrams** |
|  | A \_\_\_\_\_\_\_ is a semiconductor device that can be used as an “electrical switch” or as an amplifier. | Transistor  |
|  | \_\_\_\_\_\_\_\_ are switches that are turned on and off using electricity. They allow a low-power signal to control a large amount of power. | Relays  |
|  | Voltage that must be applied across the relay coil leads to open or close the contacts -  | Coil Voltage |
|  | The amount of current drawn by the coil; this much current is required to close the contacts - | Coil Current(relatively small current) |
|  | The amount of current that can pass through the contact leads without damaging the relay -  | Contact Rating / Current(larger current) |
|  | Contacts are open when no current is passed through the coil. Passing current through the coil causes the contacts to close, allowing power to flow through the contact leads. | Normally Open (NO) Relay |
|  | Contacts are closed when no current is passed through the coil. Passing current through the coil causes the contacts to open, preventing power from flowing through the contact leads. | Normally Closed (NC) Relay |
|  | Using a set of switches, wired in series, to control a larger voltage/current using a much smaller voltage/current. | Cascading Switches |
|  | \_\_\_\_\_\_\_ allow current to flow in only one direction. Sometimes use to help protect circuit elements. (flyback) | Diodes  |
|  | The value of a process variable (e.g. temperature, pressure, depth, rpm…) that a process control system attempts to maintain. | Setpoint(Range) |
|  | A component that has the ability to store an electrical charge. Often constructed from two plates separated by a non-conducting dielectric. | Capacitor  |
|  | \_\_\_\_\_\_\_\_\_ are generally used to isolate one circuit from another, block unwanted AC signals, or produce wave shapes. | Capacitors |
|  | May retain a charge long after power is removed from a circuit. Can cause shocks (sometimes fatal) or damage to connected equipment. | Capacitors |
|  | Capacitance is related to voltage by \_\_\_\_\_, where *q* is charge (in coulombs), and *V* is the voltage between the plates.  | $$C\_{p}=\frac{q}{V}$$ |
|  | For two parallel plates, capacitance is given by –  | $$C\_{p}=\left(8.854×10^{-12}^{F}/\_{m}\right)\left(\frac{εA}{d}\right)$$ |
|  | As the capacitance increases, the discharge time of an RC circuit increases.  |  |
|  | As the capacitance decreases, the charge time decreases. |  |
|  | A time constant (𝜏), is a value that describes how well a particular circuit responds to change. The RC circuit’s time constant is given by | $$τ=RC\_{p}$$ |
|  | Once the voltage reaches 63.2% of the entire charged voltage, the amount of time that has elapsed is equal to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_. | Time Constant ($τ$) |