Exercise 1 – RD412 – Ethan van der Walt

1. A Programming Logic Controller (PLC) is a versatile electronic device that is specifically designed for automation and control in manufacturing and industrial applications. It can be viewed as the brain of most industrial systems, receiving input from sensors, switches and buttons and then making decisions based on these inputs. The main function of a PLC would be automation, as it relieves the need for physical labour.
2. Reliability – PLCs do not use moving parts, whereas mechanical relays do, and this makes them wear out over time. A PLC has a longer and more reliable lifespan due to this fact.
   Expandability – The program of a PLC can simply be modified to introduce new components, whereas in a relay system, one would need to physically install and rewire new components.
   Size – PLCs are extremely compact and space-efficient, sometimes even just a third of the size of a relay logic cabinet.

3.) A – Power supply

B – CPU

C – Input/Output Modules

D – Communication Interfaces

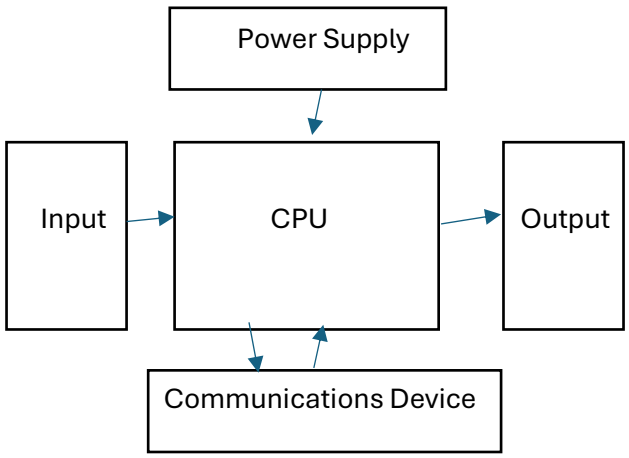
4.) A – Power Supply

B – Input Module

C – Output Module

D – CPU

5.)



6.) The PLC scan cycle begins with an input scan where the PLC will look at each input card to determine whether it is on or off and then this information is stored in a table so that it remains consistent throughout the scan. The next step is logic execution where the program will look at the stored input values in order and decide what the respective output values should be. When the execution is complete, the PLC updates the status of the outputs based on the stored input values and results of the execution.

7.) Compact PLCs are simple, fixed and suitable for small-scale applications.

Modular PLCs are versatile, scalable and cater to industrial needs.

Rack-mounted PLCs are derived from modular systems, but they are optimized for process control and large-scale manufacturing.

8.) PLCs are used in Elevators. They detect the different floors requesting the elevator as the form of input, then execute and assign accordingly and as output, they direct the elevator to the desired floor.

9.)

10.) Ladder Logic - Ladder logic evolved from electrical circuit drawings, which resemble the shape of a ladder when drawn. As a graphical language, the instructions represent electrical contacts and coils. The vertical sides of the ladder diagram are known as “rails,” and the horizontal circuits are often called “rungs.”

Function Block Diagram - The function blocks (FBs) evolved from Boolean algebra, the AND and OR representing basic logic. More complex blocks are used for math, loading, comparing and transferring data, timing and counting.

Structured Text - Structured text resembles high-level programming languages, such as Pascal or C. Variables are declared as a data type at the beginning of routines as well as configuration of other parameters.

Instruction List - Graphical languages are usually converted into a text language called Instruction List before being compiled into another low-level code called machine language. Before the advent of personal computers, handheld programmers were used to type instructions into the PLC before compilation.

Sequential function charts - SFC makes use of blocks containing code that typically activates outputs or performs specific functions. In many platforms, the blocks or “steps” can contain code written in other IEC programming languages, such as Ladder or FBD. The program moves from block to block by means of “transitions”, which often take the form of inputs.