10.a PLC Programming

Functional Area: Op&Log/QA

Assessment criteria	**Knowledge**
LO10a.1. Recognizes programmable devices involved in the control of dynamic systems, identifying its functionality and determining its technical characteristics Basic: Data acquisition Intelligent sensors Remote management Remote diagnostic 1. Recognizes programmable devices, identifying their functionality and determining their technical characteristics. Intelligent sensors 2. Program the programmable automaton and know its programming. 3. It recognizes the control sequences of the programmed systems, interpreting the requirements and establishing the necessary programming procedures. Intelligent sensors 4. Program combination and sequential systems, starting from the control conditions and using structured techniques. 5. Configures programmable systems by selecting the component elements.	**1. Recognition of programmable devices:** 1.1 Automatic applications with programmable sequential systems. 1.2 Functionality of the devices of a programmable sequential system. 1.3 Operational of programmable devices. Operating principle and basic concepts: internal structure, programming, programme transmission and programme implementation cycle, among others. 1.4 Classification of programmable devices. Classification criteria. Programmable relays, PLC compacte, modular PLC, PLC for specific applications and programmable security devices, among others. 1.5 Components of programmable devices. Classification, typology and functionality. Module type 1.6 Technical characteristics of programmable devices. Power supply, inputs and outputs, communication ports, program execution time and memory capacity among others. **Intelligent sensors** 1.7 PLC for security. **2. Configuration of programmable systems:** 2.1 Technical specifications of the installation. Functionality requirements, compatibility with other systems and environmental conditions, among others. 2.2 Selection and sizing criteria for programmable devices. 2.3 Criteria for selecting components. 2.4 Security elements in a PLC. Safety relay, redundant PLC, among others. 2.5 Representation of the sketch. 2.6 Schematics of connection. 2.7 Standardised symbology. 2.8 Existing regulations and rules

	3. Recognition of programmable automata and programming: 3.1 Numbering and coding systems. Conversion between systems. 3.2 Logical functions applied to automaton programming. 3.3 Techniques for designing circuits of combinational control automatisms by systematic methods. 3.4 PLC programming languages. Standard IEC 61131-3. Textual languages: instruction list (IL) and structured text (ST). Graphical languages: contact diagram (LD), logical functions (FBD) and function diagram sequencing (SFC), among others. 3.5 PLC programming instructions. Treatment of binary inputs and outputs, retention functions, flank functions, timers, counters, comparators, motion of values and displacement registers, between 3.6 Linear programming techniques and structured programming. Program organization blocks or units. 3.7 Programming techniques of automata from different manufacturers. 3.8 Technical and commercial documentation of manufacturers. 3.9 Existing regulations and rules **4. Recognition of control sequences of programmed systems:** 4.1 Interpretation of requirements. Technical and functional characteristics. 4.2 Systematic methods for programming control sequences. 4.4 Programming phases. Identification of inputs and outputs, program sections and program sequence, among others. 4.5 Programming Environments. 4.6 Critical point location techniques. 4.7 Planning for programming. General data, requirements, order calendar, receipt of material and schedule of action, among others. **5. Programming of combinational and sequential systems:**

	5.1 Automated applications of combinational and sequential systems. 5.2 Automated control sequence applications with programmed logic. 5.3 Techniques for implementing systematic programming methods for sequential systems using different programming languages. 5.4 Program blocks or organizational units.
	Skills
	1. Recognizes programmable devices, identifying their functionality and determining their technical characteristics. 1.1 Recognizes automatic applications with programmable sequential systems. 1.2 Identifies the function of sequential devices within a sequential system. 1.3 Identifies the operation of programmable devices. 1.4 Classifies programmable devices according to different criteria. 1.5 Relates the components of programmable devices to their functionality. 1.6 Determines the technical characteristics of programmable devices. 1.7 Identifies security features in PLCs. 2. Configures programmable systems, selecting and connecting the elements that compose it. 2.1 Identifies technical specifications for automation. 2.2 Selects the appropriate components depending upon the technical and safety specifications**. Intelligent sensors** 2.3 Represents the automatic system sketch. 2.4 Draws the installation connection schemas. 2.5 Uses standardized symbology. 2.11 Use the appropriate tools for each operation. **3. Program the programmable automaton and know its around programming.**

	3.1 Relates numbering systems and information coding systems. 3.2 Identifies logical functions. 3.3 Uses systematic methods to solve cases of cablings electrical automatism circuit applications. 3.4 Uses different programming languages. 3.5 Know the different PLC programming instructions. 3.6 Identifies programming techniques. 3.7 PLC program from different manufacturers and compares its functionalities. 3.8 Analyzes the technical and commercial documentation of the different manufacturers. **4. Recognizes the control sequences of the programmed systems, interpreting the requirements and establishing the necessary programming procedures.** 4.1 Determines technical and functional requirements. 4.2 Sets the control sequence. 4.3 Determines the different types of operation. 4.4 Identifies the programming phases. 4.5 Recognizes different programming environments. 4.6 Evaluates the critical points of programming. 4.7 Develop a detailed programming plan. **5. Programme combined and sequential systems, based on control conditions and using structured techniques.** 5.1 Design and analyze the program of combinational and sequential systems. 5.2 Design and program control sequences using structured techniques. Apply different programming languages. 5.3 Identifies the different blocks or units of program organization. 5.4 Carries out the program, facilitating future modifications. 5.6 Considers the expected process times.
	Transferable skills

	• Understand descriptions, specifications, manuals and other info typical of the profession in English and prepare them for next phase of project/Customer in understandable manner • Ability to communicate effectively, orally and in writing with “engineering” community and with “society”, extrapolating concepts for “non-experts) through an abstraction approach