

QUALIFICATION FILE: Advanced Diploma - PLC/SCADA/DCS Engineer (Level 5)

NSDA Reference

To be added by NSDA

Revised Application Documentation: Version 5/ 19 July, 2016

CONTACT DETAILS OF THE AWARDING BODY FOR THE QUALIFICATION

Name and address of awarding body:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY (NIELIT), CALICUT

NIT CAMPUS POST, KOZHIKODE, KERALA.

PIN – 673601.

Name and contact details of individual dealing with the submission:

Name: Shri. Arumugam J

Designation: Principal Technical Officer

Mobile: +91 9447445165

Email: arumugam@nielit.gov.in / arumugam@calicut.nielit.in

List of documents submitted in support of the Qualifications Files (attached)

- a) Revamping automation education & training (Published in: A&D Apr May 14, p. 36)
<http://www.aandd24.in/pi-india/index.php?StoryID=189&articleID=132487>
- b) Evidence of Job Market
(http://www.payscale.com/research/IN/Job=Automation_Engineer/Salary)
- c) Evidence of Course Requirement in the Industry (from timesjobs.com)

SUMMARY

Qualification Title:

- Advanced Diploma - PLC/SCADA/DCS Engineer

Nature and purpose of the Qualification:

- This Qualification is aligned to Level 5
- PLC/SCADA/DCS Engineers to meet the requirements of configuring, programming, installing and operating of industrial automation systems.

Body/bodies which will award the qualification:

Training Section,

National Institute of Electronics and Information Technology (NIELIT),

Calicut - 673601, Kerala

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Body which will accredit providers to offer courses leading to the qualification:

Training Section,
National Institute of Electronics and Information Technology (NIELIT),
Calicut - 673601, Kerala

Body/bodies which will be responsible for assessment:

Examination Cell,
National Institute of Electronics and Information Technology (NIELIT),
Calicut - 673601, Kerala

Occupation(s) to which the qualification gives access:

Industrial Automation Engineer or PLC/SCADA/DCS Engineer

Proposed level of the qualification in the NSQF:

Level 5

Anticipated volume of training/learning required to complete the qualification:

360 Hours

Entry requirements / recommendations:

- Diploma degree holder (*Electrical/ Electronics/ Instrumentation/ Industrial electronics/ Chemical Engineering/Applied Electronics and Instrumentation/ Instrumentation & Control/ Electronics & Communication/ Mechatronics*)
- M.Sc (*Electronics/ Instrumentation/ Industrial electronics only*)
- BE/B.Tech in the following discipline (Course Completion) *Electrical/ Electronics/ Instrumentation/ Industrial electronics/ Chemical Engineering/Applied Electronics and Instrumentation/ Instrumentation & Control/ Electronics & Communication/ Mechatronics.*

Progression from the qualification:

Technician/Plant Engineer → Developing Engineer → System Designer → Senior System Designer/Manager

Planned arrangements for the Recognition of Prior learning (RPL):

RPL Policy will be described as and when available

International comparability where known: Will be made available when established.

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Formal structure of the qualification:

Course Structure:

This course contains total four modules. After completing that modules, earn the Advanced Diploma degree.

<i>Module Code</i>	<i>Module Name</i>	<i>Mandatory /Optional</i>	<i>Theory Hours</i>	<i>Practical Hours</i>	<i>Total Marks</i>	<i>Level</i>
IA 101	Industrial Field Instrumentation	M	50	50	100	5
IA 102	PLC & PID controllers	M	40	60	100	5
IA 103	SCADA / HMI System Development	M	20	60	100	5
IA 104	Distributed Control System (DCS)	M	20	60	100	5
	<i>Total (360 Hours)</i>		130	230		

Objective of the Course:

This course is aimed at equipping an Engineer /Diploma holder / M.Sc holder (in specific streams) with appropriate knowledge and skills required in configuring, programming and operating Industrial automation systems with the use of Industrial Field Instruments, PLCs, SCADA/ HMI and DCS

Outcome of the Course:

PLC/SCADA/DCS Engineers to meet the requirements of configuring, programming, installing and operating of industrial automation systems.

SECTION 1

ASSESSMENT

Body/Bodies which will carry out assessment:

Examination Cell, NIELIT, Calicut

Will the assessment body be responsible for RPL assessment?

Yes

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, consistent and fair and show that these are in line with the requirements of the NSQF:

Assessment is done by Examination Cell, NIELIT, Calicut.

The Examination Cell develops assessment strategy unique to each module which bifurcate the theory and practical with higher emphasis on Practical Assessment.

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Each Module Assessment consists of Internal Marks, Practical Examination and Theory Examination. The internal marks are awarded based on the Solution Progress of Lab Exercises and Mini Projects/problem solving skill.

ASSESSMENT EVIDENCE

In this section, you are asked to show how the assessments you will use will cover all the outcomes and criteria in the qualification.

NIELIT Assessment / Examination Committee / Panel doing all module assessment and provide grades

Module	Assessment (Marks)				Job Role
	Theory	Practical	Problem solving skill	Total	
IA101 -Industrial Field Instrumentation	40	40	20	100	Technician/operator in field instruments
IA102 - PLC & PID controllers	30	50	20	100	PLC configuration / Programmer
IA103 - SCADA / HMI System Development	30	50	20	100	SCADA/HMI Developer
IA - 104 Distributed Control System (DCS)	30	50	20	100	DCS Configuration/Developer
All modules completed (Job roll) - Industrial Automation Engineer or PLC/SCADA/DCS Engineer					

A + ==> 100 - 90	A ==> 80 - 89.9	B + ==> 70 - 79.9
B - ==> 60 - 69.9	C ==> 50 - 59.9	D ==> 40 - 49.9
RA (Re Appear) Below 40		

SECTION 2

EVIDENCE OF LEVEL

Title/Name of qualification: Advanced Diploma - PLC/SCADA/DCS Engineer

Level: 5

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Assessed Outcome	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Industrial Field Instrumentation	Knowledge of facts principles and processes of requirements of configuring, programming, installing and operating of industrial automation systems.	Develop and implement industrial automation projects using IEC-61131-3 programming language software (PLCs). Develop interface panels using HMI/SCADA software. Implementing Distributed control Systems (DCS) technology to different Industries. Learning and maintaining the Industrial field instruments	Develop practical skills for control strategies for process plant control / Industrial automation projects. Will be able to solve the problems and will be effectively communication	Candidate will acquire theoretical and practical problem solving skill in the field of Industrial Automation	Candidate will be able to work independently with responsibility for own work and some responsibility for others work
PLC & PID controllers					
SCADA / HMI System Development					
Distributed Control System (DCS)					

SECTION 3

EVIDENCE OF NEED

What evidence is there that the qualification is needed?

- a) Revamping automation education & training (Published in: A&D Apr May 14, p. 36)
<http://www.aandd24.in/pi-india/index.php?StoryID=189&articleID=132487>
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From industrial Survey Reports/Articles (3 files attached)

What is the estimated uptake of this qualification and what is the basis of this estimate?

40 students / Batch - 3 Batches / Year

Hardware and Software availability in NIELIT Calicut

What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF?

The qualification is validated against Nation Qualification Register (NQR).

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What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?

Based on feedback by participants, employers and based on market survey (about / requirement of latest technology in Industrial automation) the qualification will be reviewed in every 2 years.

SECTION 4

EVIDENCE OF RECOGNITION AND PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

This qualification has comprises both technical and analytic skills and can be linked to any qualification higher than this one, existing or to come.

Annexure - I

(Course Curriculum)

Module Code & Name: **IA 101 - Industrial Field Instrumentation**

Duration : **100 Hours (Theory 50 + Practical 50)**

Performance Criteria (Outcome)	Contents
Familiarization of field instrumentation and troubleshooting	<ul style="list-style-type: none">➤ Introduction of Field instrumentation➤ Introduction to pressure measurement➤ Types of pressure measuring devices and transmitters➤ Installation of pressure measuring devices➤ Configure / calibrate pressure measuring devices➤ Maintain device (Manufacturers' recommended maintenance procedures)➤ Introduction to temperature measurement➤ Define Temperature, Heat and Energy (Temperature scales)➤ Temperature measuring devices, their operation and Transmitters➤ Temperature calibrating instruments➤ Installs, calibrates and services temperature measuring devices➤ Introduction to level measurement➤ Level measuring devices, their operation and Transmitters

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	<ul style="list-style-type: none"> ➤ Calibration instruments used on level measuring devices ➤ Install, calibrate and service level measuring devices ➤ Transducer & Transmitter ➤ Installs and Maintains Final Control Elements ➤ Service, size and install control valves and actuators ➤ Install wiring in accordance with different standards
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Module Code & Name : **IA 102 - PLC & PID Controllers**

Duration : **100 Hours (Theory 40 + Practical 60)**

Performance Criteria (Outcome)	Contents
Understanding of programmable Logic controllers (PLC) & Developing PLC Programming code	<ul style="list-style-type: none"> ➤ Programming of PLC using Ladder diagrams, Function Block diagram & Structured Text Language ➤ Implementation of control techniques using PLC ➤ Programming with IEC 61131-3 Languages ➤ PLC programming with Allen Bradley SLC500 & Compact Logix series controllers ➤ Allen Bradley RS Logix 500 & 5000 Software, Emulate500 Software ➤ ABB AC500 PLC System, PM 581-ETH CPU ➤ ABB Software PS501-PROG Control Builder ➤ SIEMENS SIMATIC S7 controllers (CPU 300 & 400) ➤ SIMATIC STEP 7 Professional programming Software & S7-PLCSIM ➤ System design with PLC ➤ Comparison of different brands of PLCs ➤ Troubleshooting and maintenance of PLC systems ➤ Fundamental process control techniques ➤ Controller tuning methods

Module Code & Name: **IA 103 - SCADA / HMI System Development**

Duration : **80 Hours (Theory 20 + Practical 60)**

Performance Criteria (Outcome)	Contents
Develop a SCADA/HMI Application	<ul style="list-style-type: none"> ➤ Introduction to SCADA ➤ Different Systems in SCADA like RTUs, communication Networks and MTUs ➤ RS232-422-485 standards ➤ PLC to PLC & PLC to PC communication ➤ HART and MODBUS ➤ Profibus DP & Foundation Fieldbus ➤ Intellution's iFIX SCADA/HMI Software ➤ HMI Development, Data Processing, Control Algorithm Programming ➤ Modem connectivity & SCADA protocols ➤ Network Communications, Communication with RTUs ➤ Data Acquisition with Cards and PLCs/RTUs

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	<ul style="list-style-type: none"> ➤ Database Connectivity ➤ SCADA development for Small Scale Pilot Plants (Case Study) ➤ OPC (OLE for Process Control) Configuration ➤ Comparison of different SCADA packages
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Module Code & Name: **IA 104 - Distributed Control System (DCS)**

Duration : **80 Hours (Theory 20 + Practical 60)**

Performance Criteria (Outcome)	Contents
Develop and configure Distributed Control System (DCS) application	<ul style="list-style-type: none"> ➤ Distributed Control System (DCS) architecture ➤ Introduction to ABB Freelance DCS ➤ Control Builder F Configuration Tool ➤ Project Management and hardware configuration ➤ ABB - AC 800F (IndustrialIT Controller) Process Station ➤ Process visualization software, DigiVis, for Operator Stations ➤ Developing DCS programs, task based programming and function blocks ➤ S800 Distributed I/O modules and interfaces ➤ Foundation fieldbus and profibus interfaces to DCS ➤ Device configuration via FDT/DTM ➤ Process measurements & control through fieldbus I/Os Data access through gateways

Annexure - II

Candidates Trained

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Sl.No	Year	Batches/Year	March	July
1	2011	1		26
2	2012	1	25	
3	2013	2	30	51
4	2014	2	40	34
5	2015	2	37	34
6	2016	1		48
		9	132	193
Total				325

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