Model Curriculum

Industrial Automation Technician

SECTOR : INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION
SUB-SECTOR : INSTRUMENTATION & AUTOMATION
OCCUPATION : INSTALLATION & COMMISSIONING
REF ID : IAS/Q5601, V1.0
NSQF LEVEL : 4

Skill India
कौशल भारत - कुशल भारत

IASC
SECTOR SKILL COUNCIL
एक कदम आत्मनिर्भरता की ओर

N·S·D·C
National
Skill Development
Corporation

Certificate

CURRICULUM COMPLIANCE TO

QUALIFICATION PACK - NATIONAL OCCUPATION STANDARDS

Is hereby issued by the

INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION SECTOR SKILL COUNCIL

For the

MODEL CURRICULUM

Complying of National Occupational Standards of

Job Role/Qualification Pack : **'Industrial Automation Technician'** QP No. **'IAS/Q5601 v1.0 NSQF Level 4'**

Date of Issuance : May 02nd ,2019

Valid up to : May 01st ,2023

*Valid up to the next review date of the Qualification Pack

Authorised Signatory
(INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION)

TABLE OF CONTENTS

Industrial Automation Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Industrial Automation Technician", in the "Instrumentation Automation Surveillance & Communication Sector Skill Council" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Industrial Automation Technician**		
Qualification Pack Name & Reference ID	IAS/Q5601, v1.0		
Version No.	1.0	**Version Update Date**	17th Oct. 2018
Pre-requisites to Training	ITI (Electrical, Electronics, Instrumentation) or 3 Years Diploma in (Electrical, Electronics, Instrumentation)		
Training Outcomes	**After completing this programme, participants will be able to:** • Identify client requirements of control panels. • Prepare installation and integration of control panel • Carryout installation of control panel • Carryout testing of control panel • Carryout integration of control panel with customer system • Carryout commissioning of control panel • Follow health and safety norms of the industry and the organization to ensure health and safety of self, others, asset and environment. • Work effectively in a team		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "Industrial Automation Technician" Qualification Pack issued by "Instrumentation Automation Surveillance & Communication Sector Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction to Industrial Automation System and Basic Electricals and Electronics** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 16:00 **Corresponding NOS Code** IAS/N5605	• Identify the components and technologies involved in a typical automation system. • Describe basic concepts of current, voltage, power factor & power, ohms law, kirchhoff's laws, line & neutral, single and three phase systems. • Identify basic electronic components viz diodes, triodes, transistors, resistors, capacitors, inductors, LEDs, thermistors etc. • Identify basic electrical components push buttons, indicating lamps, selector/key switches, limit switches, and proximity switches etc. • Identify transformers (CT/PT), voltmeter, ammeter, energy meter, terminal blocks & din rails • Describe basic concept of relays and contactors (NO/NC). • Describe the properties of shielded & unshielded cables, cable gauges & AWG sizes, IS standards for color codes & application. • Describe electrical circuits (series / parallel), star & delta connections, bus bars, line chokes & capacitors, ISA Symbols.	Laptop, white board, marker, projector, Model Control Panel with Instruments, Controllers, Devices, Sensors, Cables, Tool Set
2	**Install and Commission Control Panel** **Theory Duration** (hh:mm) 16:00 **Practical Duration** (hh:mm) 16:00 **Corresponding NOS Code** IAS/N5605	• Identify the inventory of components and sub systems received at customer location • Identify the wired / unwired control panel according to design • Carryout installation/positioning of control panel according to drawing and specifications. • Carryout cable routing and cable termination to control panel according to drawing and specification . • Carryout testing of earth quality. • Carryout connection of tested earth system to the control panel . • Carryout continuity check of all connections. • Carryout powering of control panel from correct power source (UPS or other source). • Carryout basic integrity test of the control panel for proper operation, without connecting to the customer system.	Laptop, white board, marker, projector, Model Control Panel with Instruments, Controllers, Devices, Sensors, Cables, Tool set

3	**Integrating Control Panel with Customer Systems Under Guidance** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N5605	• Carryout integration with customer systems such as PLC, DCS, VFD, motor control panel, pump control panel etc. using drawing of the customer system. • Prepare plan for cable routing and related work. • Identify the shutdown requirement for the integration work in coordinate with the customer representative. • Carryout the required installation and connection to the customer system. • Demonstrate mounting of cable gland, cable end terminations and labeling etc. • Follow safety and quality standards of the industry and the organization. • Prepare report of integration work performed in a format specified by the commissioning engineer.	Laptop, white board, marker, projector, Model Control Panel with Instruments, Controllers, Devices, Sensors, Cables, Tool set, Meter sets.
4	**Wiring Drawings of Control Panels** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 16:00 **Corresponding NOS Code** IAS/N5605	• Demonstrate use of basic auto CAD commands. • Demonstrate editing auto CAD drawings of panel wiring. • Demonstrate creating of auto CAD drawings of panel wiring.	Laptop, white board, marker, projector, AutoCAD Software
5	**Electrical Safety Theory Duration** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N5605	• Demonstrate correct use of rubber soled shoes, gloves and goggles. • Demonstrate the correct use of MCBs, ELCBs, fuses, SFUs • Demonstrate the correct use of earthing pit design, earthing plates & strips etc.	Laptop, white board, marker, projector, electrical safety accessories, electrical switchgear, conductivity meter, earth pit and its components
6	**Tools & Equipment** **Theory Duration** (hh:mm) 02:00 **Practical Duration** (hh:mm) 06:00 **Corresponding NOS Code** IAS/N5605	• Identify the appropriate tools and equipments viz multi-meter, tong-tester, pliers and wire stripper , power drill (drill bits), megger , shielded cable tools, LAN cable tools etc.	Laptop, white board, marker, projector, tool sets, meter sets, wires, cables, terminals, sockets, supporting infrastructure

7	**Maintaining Control Panel** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N5605	• Carryout testing for continuity • Demonstrate the correct use of ferrules & cable lugs • Carryout checking the circuits • Carryout dressing the cables • Demonstrate the correct use of cable glands (single compression /double compression)	Laptop, white board, marker, projector, tool sets, meter sets, wires, cables, terminals, sockets, panels, cable tray, ferrules, cable glands, supporting infrastructure
8	**Identifying Faulty Components** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 12:00 **Corresponding NOS Code** IAS/N5605	• Carryout the testing of power supply, CT/PT, relays & contactors • Carryout testing of instrumentation (temperature/ RH sensors, flow meters, actuators) • Carryout testing of pushbuttons, indicating lamps & selector switches.	Laptop, white board, marker, projector, Tool sets, meter sets, wires, cables, terminals, sockets, supporting infrastructure
9	**Assist in Commissioning of Control Panel** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 12:00 **Corresponding NOS Code** IAS/N5605	• Demonstrate the use of appropriate tools to carry out commissioning. • Prepare user acceptance test sheet/report in the format agreed upon by the engineer and customer. • Demonstrate the use of control inputs from the panel or from the customer system • Prepare the specified observation sheet for display readings/control outputs. • Prepare the test report in the format agreed with the customer. • Prepare record of all settings, adjustments of the control panel and of the connected system to the extent relevant. • Prepare record of any connection or wiring changes to the supplied technical documents. • Create a backup of the software program running on the system, along with data, in the format specified	Laptop, white board, marker, projector

10	**Health and Safety in Workplace** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N9002	• Illustrate the importance of safety and first aid. • Identify the components of a basic first aid kit, safety tools, equipments. • Administer basic first aid at the time of emergency. • Demonstrate correct use of fire extinguishers at the time of emergency. • Follow the general safety procedures as defined by the organization • Follow electrical safety measures while operating electrical tools and RF equipment • Illustrate practices for maintaining safe and secure workplace • Participate in safety drills at workplace	Laptop, white board, marker, projector, Fire Drill accessories, First Aid kit, Protective Gear, ESD accessories
11	**Work Effectively With Teams** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N9001	• Coordinate effectively with team members to achieve work objectives • Communicate effectively with the team. • Demonstrate active listening skills while communicating	Laptop, white board, marker, projector, MS Office / Open office software, email, Printer
	Total Duration **Theory Duration 82:00** **Practical Duration 118:00**	**Unique Equipment Required:** • Laptop, white board, marker, projector, • Model Control Panel with Instruments, Controllers, Devices Sensors, switches, indicators, pushbuttons etc. • Electrical safety accessories, Electrical switchgear, Conductivity meter, Earth pit and its components • Tool sets, Meter sets, Wires, Cables, Terminals, Sockets, Panels, Cable tray, Ferrules, Cable Glands, Supporting infrastructure • Fire Drill accessories, First Aid kit, Protective Gear, ESD accessories • AUTOCAD Software, MS Office / Open office software, email, Printer	

Grand Total Course Duration: 200 Hours, 00 Minutes
Recommended OJT Hours : 20 Hours, 00Minutes

(This Syllabus curriculum has been approved by Instrumentation Automation Surveillance & Communication Sector Skill Council of India)

Trainer Prerequisites for Job role: "Industrial Automation Technician" mapped to Qualification Pack: "IAS/Q5601, v1.0"

Sr. No.	Area	Details
1	**Description**	Industrial Automation Technician is employed by System Integrators who develop control systems for industries using OEM C&I products and other bought out components. The Technician assembles and wires these in control panels; programs, tests, installs and integrates with customer systems, under guidance of the Installation Engineer. The Technician assists the Engineer in Commissioning and powering up the panel at the customer site.
2	**Personal Attributes**	This job requires interdisciplinary aptitude, ability to learn, ability to deal with a variety of technology and people of different trades and skills.
3	**Minimum Educational Qualification**	ITI, Preferably Diploma in (Electrical, Electronics, Instrumentation)
4a	**Domain Certification**	Certified for Job Role: "Industrial Automation Technician" mapped to QP: " IAS/Q5601, V1.0" . Minimum accepted score is 80%
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". Minimum accepted score is 80%.
5	**Experience**	For candidates with ITI qualification, relevant experience of 3 Years. For candidates with Diploma qualification, relevant experience of 1 Year.

Assessment Criteria

Assessment Criteria	
Job Role	Industrial Automation Technician
Qualification Pack	IAS/Q5601, V1.0
Sector Skill Council	Instrumentation Automation Surveillance & Communication

Guidelines for Assessment Criteria

1. Criteria for assessment for each Qualifications Pack will be approved by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions approved by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/ NOS/ Set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualifications Pack, every trainee should score a minimum of 70% of aggregate marks.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS				Marks Allocation	
Assessment Outcomes	**Assessment Criteria for Outcomes**		**Out of**	**Theory**	**Skills Practical**
1.IAS/N5605 Install And Commission Control Panel	PC1. identify accurately the work requirements and delivery time schedule from authorized sources		4	1	3
	PC2. carry out micro-level planning for installation and commissioning activities		4	1	3
	PC3. clarify doubts by referring to design, drawing, job instructions and work manuals before going to the site		4	1	3
	PC4. identify tools and tackles required at the site		4	1	3
	PC5. ensure availability of control panel and tools required for installation at the site before visiting the site		4	1	3
	PC6. ensure adequacy of working space, access and maintenance facilities at the site and ensure panel fixing is proper		4	1	3
	PC7. inspect and determine any transit damage of goods and equipment		4	1	3
	PC8. prepare transit damage report accurately in the presence of customer representative and proceed as per organization SOP		4	1	3
	PC9. ensure required tools are available to carry out the installation		4	1	3
	PC10.prepare a physical verification of the equipment and accessories that are available at site as per the check list		4	1	3
	PC11.ensure that all the devices in the panel are dust free		4	1	3
	PC12.check the internal panel wiring and ensure that it is in accordance with the design drawing		4	1	3
	PC13.check insulation of internal panel wiring and devices within the panel		4	1	3
	PC14.check if batteries and chargers have been assembled in accordance with manufactures recommended procedures		4	1	3
	PC15.verify the electrical conductor's sizes and capacity for installation according to specifications		4	1	3
	PC16. ensure that panel is positioned as prescribed, following safety norms		4	1	3
	PC17.inspect the connection to socket outlets, switches and protective conductors		4	1	3
	PC18.verify and / or perform settings of various components/sub-systems of the control panels supplied as per design and customer requirements		4	1	3
	PC19.ensure that fuses, switches and other protective devices are labelled correctly		4	1	3
	PC20.prepare ground and earth the panels		4	1	3
	PC21.check for various voltage levels on charged panel, danger and warning notices, if necessary		4	2	2

	PC22.follow company approved standard procedures in erection and commissioning process		4	2	2
	PC23. use the wiring diagram to validate the accuracy of the installation to meet the specifications		4	2	2
	PC24. ensure that applicable local electrical codes and standards are used		4	2	2
	PC25. ensure that no installation damage has occurred, if there is damage to the panel while installing, prepare report and proceed as per organization SOP to rectify the damage		4	2	2
	PC26. determine the process for testing the control panel and identify requirements for connections to the customer system, by referring to the organization SOP for panel testing and instruction therein		4	2	2
	PC27. ensure cable ends, glands and terminators are properly processed		4	2	2
	PC28. ensure end to end continuity of all the cables		4	2	2
	PC29. ensure control panel is grounded properly		4	2	2
	PC30. ensure continuity of all the fuses		4	2	2
	PC31. test MCB functioning to ensure it is according to panel design		4	2	2
	PC32. check the electrical load of the control panel and verify that it is within the specification		4	2	2
	PC33. check control systems interlocks, record any faults and create rectification list		4	2	2
	PC34. check each digital control point by comparing the command at the control panel and status of the devices that it controls		4	2	2
	PC35. perform continuity check, insulation resistance, functions of all devices after completion of installation of all devices		4	2	2
	PC36. check the functional testing information to be carried out in accompaniment with client and record and document the same		4	2	2
	PC37. prepare work site test report and document for future use		4	2	2
	PC38. interact with commissioning engineer in order to understand customer system integration requirements and work schedule		4	2	2
	PC39. check the design/ drawing of the customer system to extract relevant information for integration		4	2	2
	PC40. check the location of the customer system and plan for cable routing and related work, ensuring safety and efficiency		4	2	2
	PC41. check with customer's engineer or authorized person for planned integration work and ensure availability of the system		4	2	2
	PC42. check shutdown requirement for the integration work then coordinate with the customer representative and ensure availability		3	2	1

	PC43. perform the required installation and or connection to the customer system , preferably in the presence of a customer representative		3	2	1
	PC44. ensure that cable gland mounting , cable end terminations and labelling are properly done		3	2	1
	PC45. check the cleanliness of customer system and ensure that the work area is free from any packing material or debris etc.		3	2	1
	PC46. prepare a report of integration work performed in a format specified by the commissioning engineer		3	2	1
	PC47. rectify any identified errors and retest to verify correct operation, if the fault persists, report to the engineer and seek guidance		3	2	1
	PC48. check that the required tools are available to carry out the commissioning process		3	1	2
	PC49. prepare the user acceptance test performance sheet in the format agreed upon by the engineer and customer		3	1	2
	PC50. apply the control inputs from the panel or from the customer system and record resultant readings and control outputs in the specified observation sheet		3	1	2
	PC51. achieve set productivity targets consistently		3	1	2
	PC52. maintain record of damaged components as received, damaged during installation and damaged during testing		3	1	2
	PC53. ensure compliance with health and safety guidelines and rules		3	1	2
		Total	**200**	**80**	**120**
2. IAS/N9001 Work effectively with Teams	PC1. Know and understand the team objectives and goals		3	1	2
	PC2. Know team members by name. Greet them appropriately and respond to their greetings.		2	1	1
	PC3. Know the roles and responsibilities of team members Ensure others know about you and your role in the team		2	1	1
	PC4. Learn about the culture and preferences of team members – especially if they belong to other organizations or nationalities		5	1	4
	PC5. Follow organization's policies and procedures for working with team members within and outside the organization – especially relating to privacy, confidentiality and security.		2	1	1
	PC6. Create an environment of trust and mutual respect		3	1	2
	PC7. Use appropriate mode of communication –verbal, written, mail, phone or text and clearly articulate your message to ensure that the recipient understands the message.		2	1	1
	PC8. Listen to team members and try to understand what they are wanting to say. Seek or provide clarifications if you see any gap in understanding		3	1	2

	PC9. Communicate professionally and follow organization protocols. Do not overload the team members with unnecessary and unsolicited information		4	1	3
	PC10.Share important information with the team timely.		3	1	2
	PC11.Respond to communications promptly.		3	1	2
	PC12.Perform own role and produce output in time other team members to consume		3	1	2
	PC13.Receive inputs from others and work upon it per role requirement		2	1	1
	PC14.Make adjustments within the permissible rules so that work flows smoothly.		2	1	1
	PC15.Help team members to perform their role effectively and provide any clarifications and support they need		2	1	1
	PC16.Share tools and common resources fairly, taking cognizance of others' needs and schedules		2	1	1
	PC17.Resolve any contentious issues amicably, involving the team lead or the supervisor if needed		2	1	1
	PC18.Let team members know in good time if you cannot carry out your commitments, explaining the reasons and alternate solutions, if any. Let the team lead know about this.		2	1	1
	PC19.Think positively and make constructive suggestions to meet the goals		2	1	1
	PC20.Accept and give suggestions with open mind		2	1	1
	PC21.Take initiatives and volunteer to contribute		2	1	1
	PC22.Help team members with facts and figures to arrive at workable decisions		2	1	1
	PC23.Accept decisions professionally and support these, even if these do not match your suggestions and personal views		4	1	3
	PC24.Act in the interest of the team and the organization to ensure that things do not 'fall through the gap' and team goals are achieved.		4	1	3
	PC25.Take initiative to correct the situation if something seems to be going wrong.		2	1	1
	PC26.Seek help or escalate if the situation demands		2	1	1
	PC27.Follow organization's and statutory guidelines about making references or comments to social customs or preferences		2	1	1
	PC28.Refrain from making any comments to hurt sentiments		2	1	1
	PC29.Accommodate team members' preferences to the extent feasible. If these come in the way of fulfilling team goals, discuss with the supervisor/ team leader.		2	1	1
	PC30. Seek information and clarifications from others if you do not understand any customs.		2	1	1
		Total	**75**	**30**	**45**

3.IAS/N9002 Health and Safety in Workplace	PC1. Comply with general safety procedures followed in the company		3	2	1
	PC2. Follow standard safety procedures while handling an equipment, hazardous material or tool		2	1	1
	PC3. Remove finger rings or any other metal objects likely to interfere with the work before working on the unit		4	2	2
	PC4. Use of safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.		4	1	3
	PC5. Escalate about any hazardous materials or things found in the premises		4	1	3
	PC6. Report about any breach of safety procedure in the company		3	1	2
	PC7. Ensure zero accidents at work		5	2	3
	PC8. Avoid damage of components due to negligence in ESD procedures		4	1	3
	PC9. Participate regularly in fire drills or other safety related workshops organized by the company		5	2	3
	PC10.Ensure no loss for company due to safety negligence		4	1	3
	PC11. Maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials		4	2	2
	PC12. Participate in company organized health sessions such as yoga, physiotherapy or games		4	2	2
	PC13. Handle heavy and hazardous materials with care and using appropriate tools and handling equipment such as trolleys, jacks and ladders		4	2	2
		Total	**50**	**20**	**30**