

Model Curriculum

Building Automation Specialist

Sector:	Instrumentation Automation Surveillance & Communication
Sub-Sector:	Automation
Occupation:	Product Engineering / System Design
Ref ID:	IAS/Q3006
NSQF LEVEL:	5

List of NOS involved:

1. IAS/N2100 Design, Install and Provide Technical Support for HVAC System
2. IAS/N2101 Design, Install and Provide Technical Support for Fire Alarm Systems
3. IAS/N2102 Install and Provide Technical Support for Access Controls Systems
4. IAS/N2103 Install and Provide Technical Support for CCTV Surveillance Systems
5. IAS/N2104 Integrating and Controlling Building automation Systems
6. IAS/N2105 Work Effectively with Teams
7. IAS/N2003 Health and Safety in workplace
8. DGT/VSQ/N0102 Employability Skills

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Building Automation Specialist

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Building Automation Specialist”, in the “INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION” Sector/Industry and aims at building the following key competencies amongst the learner:

Program Name	Building Automation Specialist		
Qualification Pack Name & Reference ID.	IAS/Q3006, V 5.0		
Version No.	2.0	Version Update Date	26/05/2022
Pre-requisites to Training	10th + 3 Years Engineering Diploma in relevant field OR 10th + 2 years NTC or 2 years NAC + 1 year experience in relevant field OR Completed 1st Year or Pursuing 2nd Year of 3 Years Engineering Diploma in relevant field (after 12th or 2 years NTC after 10th) OR Completed 1st year or Pursuing 2nd year of BE/B-Tech in relevant field		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> • Capture client requirements of building automation needs • Study existing facilities, if any, at the client premises and suggest appropriate technologies and systems • Perform system design - to clearly identify sub systems required for the project, such as HVAC (Heating, Ventilation and Air Conditioning) system, Fire detection and Alarm system (FAS), Access Control System, CCTV Surveillance system and other associated communication, power and cabling system. • Create specifications, drawings, and Bill of Quantities (BOQ) of the system to aid in procurement • Create wiring specifications, wiring layout and wiring plan. • Inspect the correctness of the procured systems against • Install components of HVAC system and verify correct operation. • Install components of FAS system and verify correct operation. • Install components of Access Control System and verify correct operation. • Install components of CCTV system and verify correct operation. • Integrate HVAC, FAS, Access Control and CCTV systems on Building Automation System Control Panel and verify correct operation. • Work effectively in a multidisciplinary team • Follow health and safety norms of the industry 		

This course encompasses 7 out of 7 National Occupational Standards (NOS) of “Building Automation Specialist” Qualification Pack issued by “Instrumentation Automation Surveillance & Communication Sector Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	<p>Design, Install and Provide Technical Support for HVAC</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code IAS/N2100</p>	<p>Acquire Understanding of:</p> <ul style="list-style-type: none"> • Refrigeration Cycle • Components of an A/C system • Fixed Air Volume & Variable Air Volume Applications • Psychometric Able to perform: • Capture the requirements of HVAC Systems by site survey • Suggest and taking approval from the customer for HVAC Systems • Install approved HVAC components as per site requirements • Wire Electrical and Electronics components as per the requirements • Test of HVAC systems • Provide Technical Support for HVAC Systems 	<p>Laptop, white board, marker, projector,</p>
2.	<p>Design, Install and Provide Technical Support for Fire Alarm Systems</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code IAS/N2101</p>	<p>Acquire understanding of:</p> <ol style="list-style-type: none"> 1. Fire Lifecycle 2. Detection Technologies 3. Fire Panel Technologies 4. Input / Output Devices 5. Detector & Device Wiring Schema 6. Fireman's Telephony & Talkback system 7. NFPA 72 Guidelines 8. Fire Safety Strategies <p>Able to perform:</p> <ul style="list-style-type: none"> • Capture the requirements of Fire Alarm Systems by site survey 	<p>Laptop, white board, marker, projector, first aid, FAS and sensors, Firesafety gadgets and accessories, Software</p>

Sr.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • Suggest and taking approval from the customer for Fire Alarm Systems • Install approved Fire Alarm components as per site requirements • Wire Electrical and Electronics components as per the requirements • Test of new systems at customer site <p>Provide Technical Support for Fire Alarm Systems at the site</p>	
3.	<p>Install and Provide Technical Support for Access Controls Systems</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 45:00</p> <p>Corresponding NOS Code IAS/N2102</p>	<p>Acquire Understanding of:</p> <ol style="list-style-type: none"> 1. Access Control systems 2. Access Control Technologies 3. Data Encryption & Security 4. Access Control Strategy 5. Access Controllers 6. Biometrics 7. Barriers 8. Reporting & Operations <p>Able to perform:</p> <ul style="list-style-type: none"> • Capture the requirements of Access Controls Systems by site survey • Suggest and taking approval from the customer for Access Controls System • Install approved Access Controls components as per site requirements • Wire Electrical and Electronics components as per specifications • Test Access Control systems at customer premises • Provide Technical Support for Access Controls Systems Achieve Quality and Productivity as per company norms • Understanding application Requirements • Generating I/O Summary & BOQ • Preparing RFQs • Preparing & Reading Job sheets • Preparing indents, invoices, and Maintenance logs • Using MS Excel & MS Word or equivalent software for Record keeping • Preparing As-built documentation, Ferrule list • Sharing and delegation of Tasks Preparing Task Reports 	Laptop, white board, marker, projector

Sr. No.	Module	Key Learning Outcomes	Equipment Required
4.	<p>Install and Provide Technical Support for CCTV Surveillance Systems</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code IAS/N2103</p>	<p>Acquire outcome to deliver:</p> <ol style="list-style-type: none"> 1. Optics in Cameras 2. Types of Camera Technologies 3. Types of Cameras 4. Video Analytics 5. Integration Able to perform: <ul style="list-style-type: none"> • Capture the requirements of CCTV Surveillance Systems by site survey • Suggest and taking approval from the customer for CCTV System to be installed • Install approved CCTV components as per siterequirements • Wire Electrical and Electronics components as per specifications • Test CCTV Components at customer premises • Provide Technical Support for CCTV Systems • Achieve Quality and Productivity as per company norms • Understanding Components of a BuildingAutomation system • Understanding Types of I/Os (Analog, Digital, HS Pulse) • Managing DDC Instructions & Programming • Understanding DDC Networking & Architecture • Understanding Peer-to-peer & Daisy Chain Networks • Understanding Ethernet I/P & Industrial Networks • Uploading & Downloading Programs • Creating BMS Graphics Screen & Tags • Wiring for I/Os, Source and Sink Connections <p>Testing of I/O Terminations (Point Testing)</p>	<p>Laptop, white board, marker, projector, CCTV System, Software, Ethernet LAN, HMI, Devices, Sensors, Cables, Tools, Meters, Software</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
5.	<p>Integrating and controlling Building Automation Systems</p> <p>Theory Duration (hh:m m) 15:00</p> <p>Practical Duration (hh:m m) 45:00</p> <p>Corresponding NOS Code IAS/N2104</p>	<p>Able to perform:</p> <ul style="list-style-type: none"> • Integrate HVAC Components • Integrate Fire Alarm Systems • Integrate Access Control Devices • Integrate CCTV Surveillance Systems • Control and Supervise Building Automation Systems using Control Panel <p>Train the client representative on use of Control Panel</p> <ul style="list-style-type: none"> • Understand Basic AutoCAD Commands • Reading AutoCAD drawings of Wiring <p>Able to edit and create AutoCAD drawings of panel wiring</p> <ul style="list-style-type: none"> • Understanding and Use of Rubber soled Shoes, Gloves and Goggles • Understand and apply: <ol style="list-style-type: none"> 1. Conductivity of Water 2. MCBs, ELCBs, Fuses, SFUs 3. Earthing Pit design and build • Assemble Earthing Plates & Strips • Using a Multi-meter for Current, voltage (AC/DC), Resistance & Continuity measurements • Using a tester • Using a Tong-Tester • Using Pliers and Wire Stripper • Use of Allen Key Set • Using a Power Drill (Drill bits) • Using Insulation Tape • Using Wire Lugs • Using a soldering Iron • Using a Megger • Using Wrenches, Hammer, Wire bender etc. • Using a Ladder • Using Shielded cable tools Using LAN cable tools • Testing for Shorts / Continuity • Cutting required lengths • Using Ferrules & able lugs Terminal Tightening Torque 	<p>Laptop, white board, marker, projector, Devices, Sensors, Cables, Tools, Meters, Software for FAS, ACS, CCTV, HMI, AutoCAD, Electrical safety accessories, Electrical switchgear, Conductivity meter, Earth pit and its components, Tool sets, Meter sets, Wires, Cables, Terminals, Sockets, Supporting infrastructure, Wires, Cables, Terminals, Sockets, Panels, Cable tray, Ferrules, Cable Glands, Supporting infrastructure</p>

		<ul style="list-style-type: none"> • Checking the circuits • Dressing the Cables • Managing Cable Glands (Single Compression /Double Compression) • Testing Power Supply • Testing CT/PT • Testing Relays & Contactors • Testing Instrumentation (Temperature /RH Sensors, Flow meters, Actuators etc.) • Testing Pushbuttons, Indicating Lamps & Selector Switches etc. 	
6.	<p>Work Effectively with Teams</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 15:00</p> <p>Corresponding NOS Code IAS/N9001</p>	<p>Able to understand and practice:</p> <ul style="list-style-type: none"> • Creating team environment • Communicating - giving and receiving • Working cooperatively • Participating in team decision making • Demonstrating Sense of Responsibility • Showing respect for opinions, customs and preferences 	<p>Laptop, white board, marker, projector, MS Office / Open office software, email, Printer</p>
7.	<p>Health and Safety in Workplace</p> <p>Theory Duration (hh:m m) 15:00</p> <p>Practical Duration (hh:mm) 15:00</p> <p>Corresponding NOS Code IAS/N9002</p>	<ul style="list-style-type: none"> • Understanding Safety Policy • Fire & Hazardous chemicals handling • Incident Reporting • Using Fire Extinguishers A,B,C, • ESD Procedures for handling electronic components • Use of Safety Helmets, Ear plugs, Shoes, Gloves, goggles & Safety harnesses. • Using First aid for Electrical Shock & Burn victims • Perform Fire Drills & Evacuation procedures • Use of helmet & Respect for Traffic rules • Understanding Health Policy • Understanding Posture, exercise & diet 	<p>Laptop, white board, marker, projector, FireDrill accessories, First Aid kit, Protective Gear, ESD accessories</p>

	<p>Employability skills Theory Duration (hh:mm) 30:00 Practical Duration (hh:mm) 30:00 Corresponding NOS Code <i>Mapped to DGT/VSQ/N0102</i></p>		
	<p>Introduction to Employability Skills Mapped to DGT/VSQ/N0102 Duration:1.5 Hours (1.5 Theory + 0 Practical)</p>	<ul style="list-style-type: none"> • Discuss the Employability Skills required for jobs in various industries • List different learning and employability related GOI and private portals and their usage 	<p>Laptop, white board, marker, projector</p>
	<p>Constitutional values – Citizenship Mapped to NOS 60 Hours (Version No. 1) Duration:1.5 Hours (1.5 Theory + 0 Practical)</p>	<ul style="list-style-type: none"> • Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen • Show how to practice different environmentally sustainable practices 	<p>Laptop, white board, marker, projector</p>
	<p>Becoming a Professional in the 21st Century Mapped to NOS 60 Hours (Version No. 1) Duration:2.5 Hours (2.5 Theory + 0 Practical)</p>	<ul style="list-style-type: none"> • Discuss importance of relevant 21st century skills. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. • Describe the benefits of continuous learning 	<p>Laptop, white board, marker, projector</p>
	<p>Basic English Skills Mapped to NOS 60 Hours (Version No. 1) Duration: 10 Hours (5 Theory + 5 Practical)</p>	<ul style="list-style-type: none"> • Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Read and interpret text written in basic English • Write a short note/paragraph / letter/e-mail using basic English 	<p>Laptop, white board, marker, projector</p>

	<p>Career Development and Goal Setting Mapped to NOS 60 Hours (Version No. 1) Duration: 2 Hours (1 Theory + 1 Practical)</p>	<ul style="list-style-type: none"> • Create a career development plan with well-defined short- and long-term goals 	<p>Laptop, white board, marker, projector</p>
	<p>Communication skills Mapped to NOS 60 Hours (Version No. 1) Duration: 5 Hours (2 Theory + 3 Practical)</p>	<ul style="list-style-type: none"> • Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication • Discuss the significance of working collaboratively with others in a team 	<p>Laptop, white board, marker, projector</p>
	<p>Diversity and Inclusion Mapped to NOS 60 Hours (Version No. 1) Duration: 2.5 Hours (2.5 Theory+ 0 Practical)</p>	<ul style="list-style-type: none"> • Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD • Discuss the significance of escalating sexual harassment issues as per POSH 	<p>Laptop, white board, marker, projector</p>
	<p>Financial and Digital Literacy Mapped to NOS 60 Hours (Version No. 1) Duration: 5 Hours (2 Theory+ 3 Practical)</p>	<ul style="list-style-type: none"> • Outline the importance of selecting the right financial institution, product, and service • Demonstrate how to carry out offline and online financial transactions, safely and securely 	<p>Laptop, white board, marker, projector</p>
	<p>Essential Digital Skills Mapped to NOS 60 Hours (Version No. 1) Duration: 10 Hours (4 Theory+ 6 Practical)</p>	<ul style="list-style-type: none"> • Describe the role of digital technology in today's life • Demonstrate how to operate digital devices and use the associated applications and features, safely and securely • Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely • Create sample word documents, excel sheets and presentations using basic features • utilize virtual collaboration tools to work effectively 	<p>Laptop, white board, marker, projector</p>

	<p>Entrepreneurship Mapped to NOS 60 Hours (Version No. 1) Duration: 7 Hours (3 Theory+ 4 Practical)</p>	<ul style="list-style-type: none"> • Explain the types of entrepreneurship and enterprises • Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement • Create a sample business plan, for the selected business opportunity 	<p>Laptop, white board, marker, projector</p>
	<p>Total Duration 570:00</p> <p>Theory Duration 150:00</p> <p>Practical Duration300:00</p> <p>OJT Duration 60:00</p> <p>ES (Employability Skills) 60:00</p>	<p>Unique Equipment Required:</p> <ul style="list-style-type: none"> • Laptop, white board, marker, projector, Basic AC & DC Electrical & Electronics lab. • Motors, Generators, Starters, Tool sets, Meter sets, Wires, Cables, Terminals, Sockets. • Access Control System components and accessories, and ACS Software • CCTV System, Software • Ethernet LAN, HMI, Devices, Sensors, Cables, Tools, Meters • 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 • Meter sets, Wires, Cables, Terminals, Sockets, Supporting infrastructure • VFD Panel, • Fire Drill accessories, First Aid kit, Protective Gear, ESD accessories • AUTOCAD Software, MS Office / Open office software, email, Printer 	

Grand Total Course Duration: 570 Hours, 00 Minutes

Trainer Prerequisites for Job role: “Building Automation Specialist” mapped to Qualification Pack:
“Building Automation Specialist IAS/Q3006”

Sr.	Area	Details
1	Description	<p>Building Automation Specialist, also known as Project Engineer, are responsible for the system design, installation and technical support for building automation systems involving microcontroller-based systems, such as Fire Detection & Alarm System (FAS), Access Control Systems, Biometrics (ACS) & CCTV Surveillance Systems along with a variety of sensors and actuators.</p> <p>The individual is responsible for understanding client requirements, suggesting appropriate systems and technologies, system design, wiring, integration, testing, installation, and maintenance of automation systems used in modern buildings.</p> <p>The individual provides technical supports of the sub systems post installation.</p>
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 Qualifications	<p>Diploma (Mechanical / Civil / Industrial / Instrumentation / Electrical/ Mechatronics/ Electronics or similar trades)</p> <p>OR</p> <p>B.E./B.Tech. (Civil/Mechanical / Civil / Industrial / Instrumentation / Electrical/ Mechatronics/ Electronics or similar trades)</p> <p>OR</p> <p>M.Sc. (Civil/Mechanical / Civil / Industrial / Instrumentation / Electrical/ Mechatronics/ Electronics)</p>
4a	Domain Certification	Certified for Job Role: “Building Automation Specialist” mapped to QP: “Building Automation Specialist IAS/Q3006”. Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the applicable Qualification Pack: “MEP/Q0102”. Minimum accepted score is 70%.
5	Experience	<p>Diploma (Mechanical / Civil / Industrial / Instrumentation / Electrical/ Mechatronics/ Electronics or similar trades) with 2 year of industry (domain) experience and 1 year of teaching experience</p> <p>OR</p> <p>B.E./B.Tech. (Civil/Mechanical / Civil / Industrial / Instrumentation / Electrical/ Mechatronics/ Electronics or similar trades) with 1 year of industry (domain) experience and 1 year of teaching experience</p> <p>OR</p> <p>M.Sc. (Civil/Mechanical / Civil / Industrial / Instrumentation / Electrical/ Mechatronics/ Electronics) with 1 year of industry (domain) experience and 1 year of teaching experience</p>

