

# Model Curriculum

## Instrumentation Technician (Control Valve)

**Sector:** Instrumentation Automation Surveillance & Communication  
**Sub-Sector:** Instrumentation  
**Occupation:** Maintenance  
**Ref ID:** IAS/Q3001

### List of NOS involved:

1. IAS/N0100 Maintain Control Valve Health
2. IAS/N0101 Preventive & Predictive Maintenance- Control Valve
3. IAS/N0102 Site Management – Process Control
4. IAS/N0103 Task Reporting - Process Control
5. IAS/N0104 Corrective Maintenance – Control Valve
6. IAS/N0105 Safety, Health and Environment – Process Control
7. IAS/N2105 Work Effectively With Teams

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# Instrumentation Technician (Control Valve)

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of an “Instrumentation Technician (Control Valve)”, in the “INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION” Sector/Industry and aims at building the following key competencies amongst the learner:

<b>Program Name</b>	<b>Instrumentation Technician (Control Valve)</b>		
<b>Qualification Pack Name &amp; Reference ID.</b>	IAS/Q3001, V 1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	30/07/2019
<b>Pre-requisites to Training</b>	12th Pass, Preferably ITI – Instrumentation/Electrical/Electronics		
<b>Training Outcomes</b>	<p><b>After completing this programme, participants will be able to perform:</b></p> <ul style="list-style-type: none"> <li>● Visual and Integrity checks of Control Valve</li> <li>● Housekeeping in Control Valve testing bay</li> <li>● Comply with Electrical safety norms</li> <li>● Monitor Consumables storage and consumption</li> <li>● Monitor Status of control valve name plate</li> <li>● Undertake Work Area audit</li> <li>● Complete entries of Check Lists and ensure closing</li> <li>● Obtain Work permit</li> <li>● Plan, Execute and Complete PM Schedule</li> <li>● Prepare Process List</li> <li>● Perform Visual Checks and corrective actions</li> <li>● Prepare PRM-List. Include PM Jobs to be taken during Shut down</li> <li>● Follow up PM list</li> <li>● Support Statutory Audits</li> <li>● Interact with Service contract vendors</li> <li>● Prepare Inspection &amp; Test Reports</li> <li>● Support Shut Down procedures</li> <li>● Perform Stores Procedures</li> <li>● Report faults, unusual occurrence, theft, security breach</li> <li>● Prepare PM Report</li> </ul>		

	<ul style="list-style-type: none"> <li>• Prepare Corrective Maintenance report</li> <li>• Identify Corrective Maintenance needs</li> <li>• Identify Corrective Maintenance Spares</li> <li>• Follow Corrective Maintenance plan</li> <li>• Execute Corrective Maintenance plan</li> <li>• Brief Supervisor on Corrective Maintenance</li> <li>• Complete Corrective Maintenance Check List / Report</li> <li>• Close Corrective Maintenance fault list</li> <li>• Maintain Basic Site Hygiene</li> <li>• Follow Safety, Health, Environment (SHE) norms of the industry and the organization</li> <li>• Follow SHE-Instructions and Personal Protection directives</li> <li>• Support SHE-Audit</li> <li>• Work effectively in a team</li> </ul>
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This course encompasses 7 out of 7 National Occupational Standards (NOS) of “Instrumentation Technician (Control Valve)” Qualification Pack issued by “Instrumentation Automation Surveillance & Communication Sector Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p><b>Overview of Instrumentation and Process Control</b></p> <p><b>Theory Duration</b> (him) 08:00</p> <p><b>Practical Duration</b> (him) 16:00</p> <p><b>Corresponding NOS Code</b> IAS/N0100 IAS/N0101 IAS/N0102 IAS/N0104 IAS/N0105</p>	<ul style="list-style-type: none"> <li>• Recapitulate different types of sensors, instruments and control elements.</li> <li>• Recapitulate basic principles of measurement, connections and practices in process control.</li> <li>• Recapitulate standards, interfaces, symbols and terminology used in process control.</li> <li>• Recapitulate principles of control loops and function of control valves.</li> <li>• Recapitulate safety and plant security practices.</li> <li>• Recapitulate different kinds of process industries, their unique characteristics and requirements.</li> <li>• Familiarize with advances in Control Valve technologies and practices</li> </ul>	Laptop, white board, marker, projector, Process Control lab
2	<p><b>Maintain Control Valve Health</b></p> <p><b>Theory Duration</b> (him)</p>	<p>Able to:</p> <ul style="list-style-type: none"> <li>• Perform Integrity checks</li> <li>• Perform Visual Checks</li> <li>• Perform Control Valve Installations – Visual Checks</li> </ul>	Laptop, white board, marker, projector, MS Office / Open office, Process Control lab, Industry

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	08:00 <b>Practical Duration</b> (him) 16:00 <b>Industry visit</b> (him) 08:00  <b>Corresponding NOS Code</b> IAS/N0100	<ul style="list-style-type: none"> <li>Perform Housekeeping in Control Valve testing bay</li> <li>Follow Electrical safety norms</li> <li>Monitor Consumables storage and consumption</li> <li>Check Status of control valve name plate</li> <li>Undertake Work Area audit</li> <li>Complete Entries and closing of Check Lists</li> </ul>	visits
3	<b>Preventive &amp; Predictive Maintenance- Control Valve</b>  <b>Theory Duration</b> (him) 08:00 <b>Practical Duration</b> (him) 24:00 <b>Industry visit</b> (him) 08:00  <b>Corresponding NOS Code</b> IAS/N0101	Able to: <ul style="list-style-type: none"> <li>Obtain Work permit</li> <li>Execute PM Schedule</li> <li>Prepare Process List</li> <li>Plan PM Schedule</li> <li>Perform Visual Checks and corrective actions</li> <li>Complete PM Schedule</li> <li>Prepare PRM-List</li> <li>Include PM Jobs to be taken during Shut down</li> <li>Follow up PM list</li> </ul>	Laptop, white board, marker, projector, MS Office / Open office, Process Control lab, Industry visits
4	<b>Site Management – Process Control</b>  <b>Theory Duration</b> (him) 08:00 <b>Practical Duration</b> (him) 08:00 <b>Industry visit</b> (him) 08:00  <b>Corresponding NOS Code</b> IAS/N0102	Able to: <ul style="list-style-type: none"> <li>Support Statutory Audits during inspection - such as IBR inspection formalities and stamping of IBR items including control valves and associated accessories which fall in the IBR area</li> <li>Interact with Service contract vendors. Perform formalities of the site visit of the representative of the Service Contract vendor for control valve</li> <li>Prepare Inspection &amp; Test Reports</li> <li>Support Shut Down procedures. Support formalities and coordination relating to Process and Mechanical departments during opportunistic shut down and Annual shut down</li> <li>Perform Stores Procedures. Withdraw from and return material to the stores.</li> </ul>	Laptop, white board, marker, projector, MS Office / Open office, Process Control lab, Industry visits

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		Inspect new material received at stores	
5	<b>Task reporting – Process Control</b>  <b>Theory Duration</b> (him) 08:00 <b>Practical Duration</b> (him) 08:00  <b>Corresponding NOS Code</b> IAS/N0103	Able to: <ul style="list-style-type: none"> <li>• Brief and Escalate faults/issues to immediate supervisor</li> <li>• Complete entry of preventive maintenance check lists/reports</li> <li>• Complete entry of Corrective Maintenance Check lists /reports</li> <li>• File report on noticing any visible changes in control valve installation or its accessories. Report for immediate attention of supervisor</li> <li>• Report any theft in control valve assembly/spares to supervisor</li> <li>• Report suspicious movement of new persons near control valve installation to security and supervisor</li> </ul>	Laptop, white board, marker, projector, MS Office / Open office, Data recording and communication equipment
6	<b>Corrective Maintenance – Control Valve</b>  <b>Theory Duration</b> (him) 08:00 <b>Practical Duration</b> (him) 24:00 <b>Industry visit</b> (him) 08:00  <b>Corresponding NOS Code</b> IAS/N0104	Able to: <ul style="list-style-type: none"> <li>• Identify Corrective Maintenance needs</li> <li>• Identify Corrective Maintenance Spare parts requirements</li> <li>• Follow Corrective Maintenance plan</li> <li>• Execute Corrective Maintenance plan. This includes:               <ul style="list-style-type: none"> <li>○ Valve disassembly; seat, stem, gland replacement; bonnet gaskets actuator stem connection along with spring actuator servicing</li> <li>○ Reassembly, Hydro test and Leak test</li> <li>○ Diaphragm replacement, tests on positioner, booster, current to pneumatic convertor, tubing, , valve stroking, leak checks and final line up on the plant</li> </ul> </li> <li>• Brief Supervisor on Corrective Maintenance</li> <li>• Complete Corrective Maintenance Check List / Report</li> <li>• Close Corrective Maintenance fault list</li> </ul>	Laptop, white board, marker, projector, MS Office / Open office, Process Control lab, Industry visits

Sr. No.	Module	Key Learning Outcomes	Equipment Required
7	<p><b>Safety, Health and Environment – Process Control</b></p> <p><b>Theory Duration</b> (him) 08:00</p> <p><b>Practical Duration</b> (him) 08:00</p> <p><b>Corresponding NOS Code</b> IAS/N0105</p>	<p>Able to:</p> <ul style="list-style-type: none"> <li>• Interpret and follow formal Instructions from SHE Dept.</li> <li>• Participate in the prescribed drills including familiarization of personal protective equipment, fire extinguisher and first aid.</li> <li>• Follow instructions on Work permit, Fire permit and Hazardous Area Classification, Fire and explosion hazards</li> <li>• Use right personal protective equipment</li> <li>• Support supervisor during SHE Audit.</li> </ul>	<p>Laptop, white board, marker, projector, MS Office / Open office, Data recording and communication equipment, Fire Drill Accessories, First Aid Kit, Protective Equipment</p>
8	<p><b>Work Effectively With Teams</b></p> <p><b>Theory Duration</b> (hh:mm) 08:00</p> <p><b>Practical Duration</b> (hh:mm) 08:00</p> <p><b>Corresponding NOS Code</b> IAS/N2105</p>	<p>Able to understand and practice:</p> <ul style="list-style-type: none"> <li>• Creating team environment</li> <li>• Communicating - giving and receiving</li> <li>• Working cooperatively</li> <li>• Participating in team decision making</li> <li>• Demonstrating Sense of Responsibility</li> <li>• Showing respect for opinions, customs and preferences</li> </ul>	<p>Laptop, white board, marker, projector, MS Office /Open Office software, email, Printer</p>
	<p><b>Total Duration</b></p> <p><b>Theory Duration</b> <b>64:00</b></p> <p><b>Practical Duration</b> <b>112:00</b></p> <p><b>Industry visit</b> <b>32:00</b></p>	<p><b>Unique Equipment Required:</b></p> <ul style="list-style-type: none"> <li>• Laptop, white board, marker, projector,</li> <li>• Process Control lab - including sensors for temperature, pressure, flow etc., actuators, control valves, limit switches, PID controller, Power sources, meters, tools etc.</li> <li>• MS Office / Open office,</li> <li>• Data recording and communication equipment</li> <li>• Fire Drill Accessories,</li> <li>• First Aid Kit,</li> <li>• Protective Equipment</li> <li>• Industry visits</li> </ul>	

**Grand Total Course Duration: 208 Hours, 00 Minutes**

## Trainer Prerequisites for Job role: “Instrumentation Technician (Control Valve)” mapped to Qualification Pack: “IAS/Q3001”

Sr. No.	Area	Details
1	<b>Description</b>	<p>Instrumentation Technician (Control Valve)" is Responsible for maintaining Control Valve and Control Valve accessories in rotational or general shift duties and to attending emergency calls.</p> <p>Plays an essential role during the startup and shut down of the processes as during these periods full availability and performance of the control valves are critical.</p> <p>During normal operation of the plant, the individual ensures proper functioning of the control valve is important for the overall health of the plant and stability of control loops.</p>
2	<b>Personal Attributes</b>	The individual must be self-disciplined; assertive; team player; action-orientated; possess analytical skills and problem solving ability; good inter personnel skills and ability to work under pressure.
3	<b>Minimum Educational Qualifications</b>	12th pass, Preferably ITI - Instrumentation/Electrical/Electronics
4a	<b>Domain Certification</b>	Certified for Job Role: “Instrumentation Technician (Control Valve)” mapped to QP: “ <u>IAS/Q3001</u> ”. Minimum accepted score is 80%
4b	<b>Platform Certification</b>	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted score is 70%.
5	<b>Experience</b>	<p>0 - 5 years relevant industry experience, depending on qualification</p> <p>For 12<sup>th</sup> pass: Five years.</p> <p>For ITI - Instrumentation/Electrical/Electronics: Three years.</p> <p>For Diploma in Instrumentation/Electronics/Electrical: Two Years.</p>



### Annexure: Assessment Criteria

<b>Assessment Criteria</b>	
<b>Job Role</b>	<b>Instrumentation Technician (Control Valves)</b>
<b>Qualification Pack</b>	<b>IAS/Q3001</b>
<b>Sector Skill Council</b>	<b>INSTRUMENTATION AUTOMATION SURVEILLANCE &amp; COMMUNICATION</b>

### **Guidelines for Assessment**

1. Criteria for assessment for each Qualification 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. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

<b>Sl. No.</b>	<b>NOS no.</b>	<b>NOS Name</b>	<b>% Weightage</b>
1	IAS/N0100	Maintain Control Valve Health	20
2	IAS/N0101	Preventive & Predictive Maintenance- Control Valve	25
3	IAS/N0102	Site Management – Process Control	10
4	IAS/N0103	Task Reporting - Process Control	10
5	IAS/N0104	Corrective Maintenance – Control Valve	25
6	IAS/N0105	Safety, Health and Environment – Process Control	5
7	IAS/N2105	Work Effectively With Teams	5
			<b>100%</b>

Assessment Outcomes	Assessment Criteria for Outcomes	Marks Allocation			
		Total Marks (100+200+100+100+200+50+75)	Out of	Theory	Skills Practical
<b>1. IAS/N0100 Maintain Control Valve Health</b>	PC1. Perform Control Valve Hygiene Checks as prescribed by Organizational norms in the following areas: Control valve installations and their accessories, testing bay in the Instrumentation workshop, test equipment and test pumps	<b>100</b>	20	8	12
	PC2. Check for visual damage and tampering on control valve installations. Note and report to supervisor		10	4	6
	PC3. Check housekeeping near control valve installations		10	2	8
	PC4. Check housekeeping in Control Valve testing bay in Instrumentation Workshop		10	2	8
	PC5. Check for lighting / associated electricals near control valve installation		10	4	6
	PC6. Ensure optimum storage of cleaning solvent, lubrication items and related maintenance consumables at designated space. Ensure that these are used optimally (avoid wastage and spillage)		10	3	7
	PC7. Check name plate of the manufacturer on the valve and clean with solvent, as required. Inform supervisor if damaged or missing.		10	5	5
	PC 8. Undertake work area audit with supervisor for Control Valve Installations and Control Valve testing bay areas as per work area audit check sheet		10	4	6
	PC9. Complete entries of Check Lists for Control Valve Hygiene issued by the company		10	5	5
		<b>Total</b>	100	37	63
<b>2. IAS/N0101 Preventive &amp; Predictive Maintenance – Control Valve</b>	PC1. Obtain Permit to Work.	<b>200</b>	10	5	5
	PC2. Carry out Preventive Maintenance as per Schedule for the day.		40	10	30
	PC3. Prepare list on basis of process request		20	10	10
	PC4. Plan for next day Preventive Maintenance schedule		20	10	10
	PC5. Carry out-Visual Checks and action wherever possible or else transfer job to shut down list.		30	10	20
	PC6. Complete preventive maintenance schedule list of control valve body, actuator and accessories. Close the issues in the list.		20	5	15

	PC7. Collect and consolidate daily diagnostic messages from Control Valve which have a digital valve controller and record the same in either Preventive Maintenance list or Opportunistic shut down list for execution		15	7	8
	PC8. Include preventive maintenance jobs during annual shut down or opportunistic shut down		25	10	15
	PC9. Follow up on consolidated preventive maintenance list and close.		20	5	15
		<b>Total</b>	200	72	128
<b>3. IAS/N-0102 Site Management - Process Control</b>	PC1. Familiar with IBR inspection formalities and stamping of IBR items including Control Valve and associated accessories which fall in the IBR area	<b>100</b>	20	15	5
	PC2. Familiar with formalities of the site visit of the representative of the Service Contract vendor for control valve		20	10	10
	PC3. Familiar with the appropriate Inspection and Test reports		20	15	5
	PC4. Familiar with formalities and coordination with Process and Mechanical departments during opportunistic shut down and Annual shut down		20	10	10
	PC5. Familiar with Stores procedures		20	10	10
		<b>Total</b>	100	60	40
<b>4. IAS/N0103 Task reporting – Process Control</b>	PC1. Escalate faults/issues to immediate supervisor	<b>100</b>	10	5	5
	PC2. Complete entry of preventive maintenance check lists/reports		25	10	15
	PC3. Complete entry of Corrective Maintenance Check lists /reports		25	10	15
	PC4. Complete report on noticing any visible changes in control valve installation or its accessories. Report for immediate attention of supervisor		20	10	10
	PC5. Report any theft in control valve assembly/spares to supervisor		10	5	5
	PC6. Report suspicious movement of new persons near control valve installation to security and supervisor		10	5	5
		<b>Total</b>	100	45	55
<b>5. IAS/N0104 Corrective Maintenance – Control Valve</b>	PC1. Identify need for corrective maintenance	<b>200</b>	30	15	15
	PC2. Identify spares required for corrective maintenance and list.		30	15	15
	PC3. Adhere to maintenance plan		30	10	20
	PC4. Carry out Corrective maintenance for items listed.		30	10	20
	PC5. Escalate Faults /issues to the Supervisor		20	10	10
	PC6. Complete entry of corrective maintenance check lists / reports		30	10	20
	PC7. Close maximum number of faults reported		30	10	20
		<b>Total</b>	200	80	120

<b>6. IAS/N0105 Safety, Health and Environment – Process Control</b>	PC1. Understand formal Instructions from SHE Dept.	<b>50</b>	10	5	5
	PC2. Participate in the prescribed drills including familiarization of personal protective equipment, fire extinguisher and first aid.		10	5	5
	PC3. Understand Instructions on Work permit, Fire permit and Hazardous Area Classification, Fire and explosion hazards		10	5	5
	PC4. Use right personal protective equipment		10	5	5
	PC5. Support supervisor during SHE Audit		10	5	5
		<b>Total</b>	50	25	25
<b>7. IAS/N2105 Work Effectively With Teams</b>	PC1. Know and understand the team objectives and goals	<b>75</b>	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 for 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		2	1	1

cognizance of others' needs and schedules			
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
<b>Total</b>	<b>75</b>	<b>30</b>	<b>45</b>