IASC
SECTOR SKILL COUNCIL

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National
Skill Development
Corporation

Model Curriculum

Calibration Technician (Thermal)

Sector:	**Instrumentation Automation Surveillance & Communication**
Sub-Sector:	**Instrumentation**
Occupation:	**Testing & Calibration**
Ref ID:	**IAS/Q5001**

List of NOS involved:

1. IAS/N 0200 Work Place Readiness - Calibration
2. IAS/N 0201 Calibration of Thermocouple
3. IAS/N 0202 Calibration of RTD
4. IAS/N 0203 Calibration of Infrared / Noncontact Temperature Detector
5. IAS/N 0204 Task Reporting-Calibration
6. IAS/N 0205 Preventive Maintenance-Thermal Calibration
7. IAS/N 2105 Work Effectively With Teams

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Calibration Technician (Thermal)

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Calibration Technician (Thermal)", in the "INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION" Sector/Industry and aims at building the following key competencies amongst the learner:

Program Name	Calibration Technician (Thermal)		
Qualification Pack Name & Reference ID.	IAS/Q5001, V 1.0		
Version No.	1.0	**Version Update Date**	30/07/2019
Pre-requisites to Training	B.Sc., Diploma in Instrumentation/Electrical/Electronics		
Training Outcomes	**After completing this programme, participants will be able to:** • Interpret client requirements of thermal calibration • Able to do the setting up of the existing Thermal Calibration facility for different types of thermal calibrations according to the organization procedures. • Perform calibration of Thermocouples using authorized calibration setup and procedure. • Perform calibration of RTDs using authorized calibration setup and procedure. • Perform calibration of Infrared / Non-contact Temperature Detectors using authorized calibration setup and procedure. • Perform calibration of other thermal instruments such as Gauges, Indicators etc. using authorized calibration setup and procedure. • Document and Communicate Reports relating to Calibration • Perform Preventive Maintenance of the Calibration setup • Follow health and safety norms of the industry and the organization • Work effectively in a team		

This course encompasses <u>7</u> out of <u>7</u> National Occupational Standards (NOS) of "Calibration Technician (Thermal)" Qualification Pack issued by "Instrumentation Automation Surveillance & Communication Sector Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction to Temperature Measurement and Calibration** **Theory Duration** (hh:mm) 16:00 **Practical Duration** (hh:mm) 16:00 **Calibration Lab Visit** (hh:mm) 04:00 **Industry Visit** (hh:mm) 16:00 **Corresponding NOS Code** IAS/N 0201 IAS/N 0202 IAS/N 0203 IAS/N 0205	• Familiarize with basic principles of temperature measurement. • Familiarize with different types of temperature detectors and instruments. • Familiarize with principles of calibration, instruments, practices and issues involved in calibration. • Familiarize with standards, symbols and terminology used in calibration. • Familiarize with how sensors are used in the industry	Laptop, white board, marker, projector, Thermal Calibration lab. Visit of a Certified Calibration Lab and Industry where sensors are used.
2	**Calibration of Thermocouple** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 24:00 **Corresponding NOS Code** IAS/N0201	• Understanding calibration ranges, equipment and procedures for different types of thermocouples. • Identification of type of the 'Unit Under Calibration (UUC) and verification against job order. • Preparation of UUC and the setup for calibration, according to organization SOP. • Perform and record thermocouple measurements. • Process measurement data for derived parameters • Store the results and communicate it to the supervisor and other recipients as specified in the SOP.	Laptop, white board, marker, projector, Thermocouple Calibration setup, Data recording and communication equipment

Sr. No.	Module	Key Learning Outcomes	Equipment Required
3	**Calibration of RTDs** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 24:00 **Corresponding NOS Code** IAS/N0202	• Understanding calibration ranges, equipment and procedures for different types of RTDs. • Identification of type of the 'Unit Under Calibration (UUC) and verification against job order. • Preparation of UUC and the setup for calibration, according to organization SOP. • Perform and record RTD measurements. • Process measurement data for derived parameters • Store the results and communicate it to the supervisor and other recipients as specified in the SOP.	Laptop, white board, marker, projector, RTD Calibration setup, Data recording and communication equipment
4	**Calibration of Infrared / Non contact Temperature Detector** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 24:00 **Corresponding NOS Code** IAS/N0203	• Understanding calibration ranges, equipment and procedures for different types Non contact Temperature Detectors. • Identification of type of the 'Unit Under Calibration (UUC) and verification against job order. • Preparation of UUC and the setup for calibration, according to organization SOP. • Perform and record Detector measurements. • Process measurement data for derived parameters • Store the results and communicate it to the supervisor and other recipients as specified in the SOP.	Laptop, white board, marker, projector, Non contact Temperature Detector Calibration setup, Data recording and communication equipment
5	**Preventive Maintenance- Calibration** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N0205	Understanding of: 1. Performing Visual Checks and perform prescribed action wherever possible, using SOP of the organization for system health check. 2. Performing preventive maintenance schedule list of thermal calibration setup and accessories. Close any issues in the list.	Laptop, white board, marker, projector, Thermocouple, RTD and Non contact Temperature Detector Calibration setup, Data recording and communication equipment

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Sr. No.	Module	Key Learning Outcomes	Equipment Required
6	**Task Reporting-Calibration** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N0204	• Perform: 1. Report completed task per organization process. 2. Report faults/issues to immediate supervisor 3. Perform entry of preventive maintenance check lists/reports 4. Report on noticing any visible changes in of thermal calibration setup or its accessories. Report for immediate attention of supervisor 5. Report any theft in thermal calibration setup to supervisor 6. Report suspicious movement of new persons near of thermal calibration setup to security and supervisor	Laptop, white board, marker, projector, MS Office software, email, Printer
7	**Work Place Readiness - Calibration** **Theory Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N0200	• Understanding Safety Policy of the organization. • Understand use of First Aid kit and how to treat burns. • Understand use of Fire Protection devices. • Perform Workplace Checks as prescribed by Organizational norms which includes: Cleanliness of work area and equipment, Completeness of calibration setup and an uncluttered workplace. • Handle equipment in a manner that is recommended and safe. Use gloves of the appropriate type where indicated. • Check for lighting / associated electricals at Calibration Installation. Report any deviations to electrical department. • Check for the operating temperature of the work area and confirm that it is within the specified limits for the Calibration Installation	Laptop, white board, marker, projector, Fire protection accessories, First Aid kit.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
8	**Work Effectively With Teams** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** IAS/N2105	Able to understand and practice: • 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	Laptop, white board, marker, projector, MS Office software, email, Printer
	Total Duration **Theory Duration** 60:00 hrs. **Practical Duration** 120:00 hrs. **Calibration Lab and Industry Visit** 20:00 hrs.	**Unique Equipment Required:** • Laptop, white board, marker, projector, • Thermocouple Calibration setup, • RTD Calibration setup, • Non contact Temperature Detector Calibration setup, • Data recording and communication equipment • MS Office / Open office software, email, Printer • Fire protection accessories, First Aid kit. • Supporting infrastructure	

Grand Total Course Duration: 200Hours, 00 Minutes

Trainer Prerequisites for Job role: "Calibration Technician (Thermal)" mapped to Qualification Pack: "IAS/Q5001"

Sr. No.	Area	Details
1	Description	Calibration Technician (Thermal) is employed in laboratories run by Calibration Service Providers and also employed in process industries such as Steel, Cement, Fertilizer, Power, Chemical and other industries, including OEMs. Thermal sensors are a vital part of closed control loop in these processes. Calibration Technician (Thermal) is responsible for performing calibration of thermal instruments such as Thermocouples, RTDs, and Radiation Detectors etc. for measuring temperature. The calibration is performed in calibration laboratories which are equipment with certified calibration equipment which are maintained under specified environments.
2	Personal Attributes	This job requires the individual to be disciplined, assertive, team player, possess analytical skills and problem solving ability, effective communicator and have the ability to work under pressure.
3	Minimum Educational Qualifications	ITI – Instrumentation/Electrical/Electronics
4a	Domain Certification	Certified for Job Role: "Calibration Technician (Thermal)" mapped to QP: "IAS/Q5001". 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 70%.
5	Experience	Relevant experience of 2 Years

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Calibration Technician (Thermal)
Qualification Pack	IAS/Q5001
Sector Skill Council	INSTRUMENTATION AUTOMATION SURVEILLANCE & COMMUNICATION

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

Sl. No.	NOS no.	NOS Name	% Weightage
1	IAS/N0200	Work Place Readiness - Calibration	10
2	IAS/N0201	Calibration of Thermocouple	20
3	IAS/N0202	Calibration of RTD	20
4	IAS/N0203	Calibration of Infrared / Noncontact Temperature Detector	20
5	IAS/N0204	Task Reporting-Calibration	10
6	IAS/N0205	Preventive Maintenance-Thermal Calibration	15
7	IAS/N2105	Work Effectively With Teams	5
			100%

Assessment Outcome	Assessment Criteria for Outcomes	Total Marks (60+100+100+100+100+60+ 75)	Out of	Theory	Skills Practical
1: IAS/N0200 Work Place Readiness - Calibration	PC1. Perform Workplace Checks as prescribed by Organizational norms which includes: Cleanliness of work area and equipment, Completeness of calibration setup and an uncluttered workplace.	**60**	10	5	5
	PC2. Handle equipment in a manner that is recommended and safe.		10	4	6
	PC3. Check for lighting / associated electricals at Calibration Installation. Report any deviations to electrical department.		10	2	8
	PC4. Check for the operating temperature of the work area and confirm that it is within the specified limits for the Calibration Installation		10	2	8
	PC5. Ensure that hot objects such as Thermocouples, RTDs are put inside appropriate stands or enclosures provided after removing from the hot furnace so that no accidental contact can be made and burning is avoided.		10	2	8
	PC6. Use appropriate gloves while handling hot objects.		10	2	8
	Total	**60**	**17**	**43**
2. IAS/N 0201 Calibration of Thermocouple	PC1. Verify UUC type to be calibrated	**100**	10	5	5
	PC2. Preparation of UUC and the setup for calibration, according to organization SOP.		10	5	5
	PC3. Place and connect UUC in the setup		5	2	3
	PC4. Perform and record measurements.		40	10	30
	PC5. Setup the system for next calibration batch / operation, as given in the job schedule by the supervisor.		5	2	3
	PC6. Process measurement data for derived parameters		20	10	10
	PC7. Store the results and communicate it to the supervisor and other recipients as specified in the SOP.		10	4	6
	Total	**100**	**38**	**62**
3. IAS/N 0202 Calibration of RTD	PC1. Verify UUC type to be calibrated	**100**	10	5	5
	PC2. Preparation of UUC and the setup for calibration, according to organization SOP.		10	5	5
	PC3. Place and connect UUC in the setup		5	2	
	PC4. Perform and record measurements.		40	10	30

The header row for the table reads **Marks Allocation** spanning the last four columns.

	PC5. Setup the system for next calibration batch / operation, as given in the job schedule by the supervisor.		5	2	3
	PC6. Process measurement data for derived parameters		20	10	10
	PC7. Store the results and communicate it to the supervisor and other recipients as specified in the SOP.		10	4	6
		Total	**100**	**38**	**62**
4. IAS/N 0203 Calibration of Infrared / Non contact Temperature Detector	PC1. Verify UUC type to be calibrated	**100**	10	5	5
	PC2. Preparation of UUC and the setup for calibration, according to organization SOP.		10	5	5
	PC3. Position and connect UUC in the setup		5	2	
	PC4. Perform and record measurements.		40	10	30
	PC5. Setup the system for next calibration batch / operation, as given in the job schedule by the supervisor.		5	2	3
	PC6. Process measurement data for derived parameters		20	10	10
	PC7. Store the results and communicate it to the supervisor and other recipients as specified in the SOP.		10	4	6
		Total	**100**	**38**	**62**
5. IAS/N 0204 Task Reporting- Calibration	PC1. Report completed task per organization process.	**100**	20	10	10
	PC2. Report faults/issues to immediate supervisor		20	5	15
	PC3. Perform entry of preventive maintenance check lists/reports		20	10	10
	PC4. Report on noticing any visible changes in of thermal calibration setup or its accessories. Report for immediate attention of supervisor		20	5	15
	PC5. Report any theft in thermal calibration setup to supervisor		10	5	5
	PC6. Report suspicious movement of new persons near of thermal calibration setup to security and supervisor		10	5	5
		Total	**100**	**40**	**60**
6. IAS/N 0205 Preventive Maintenance- Calibration	PC1. Carry out Visual Checks and perform prescribed action wherever possible, using SOP of the organization for system health check.	**60**	30	10	20
	PC2. Complete preventive maintenance schedule list of thermal calibration setup and accessories. Close any issues in the list.		30	10	20
		Total	**60**	**20**	**40**
7. IAS/N2105 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	**75**	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 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**