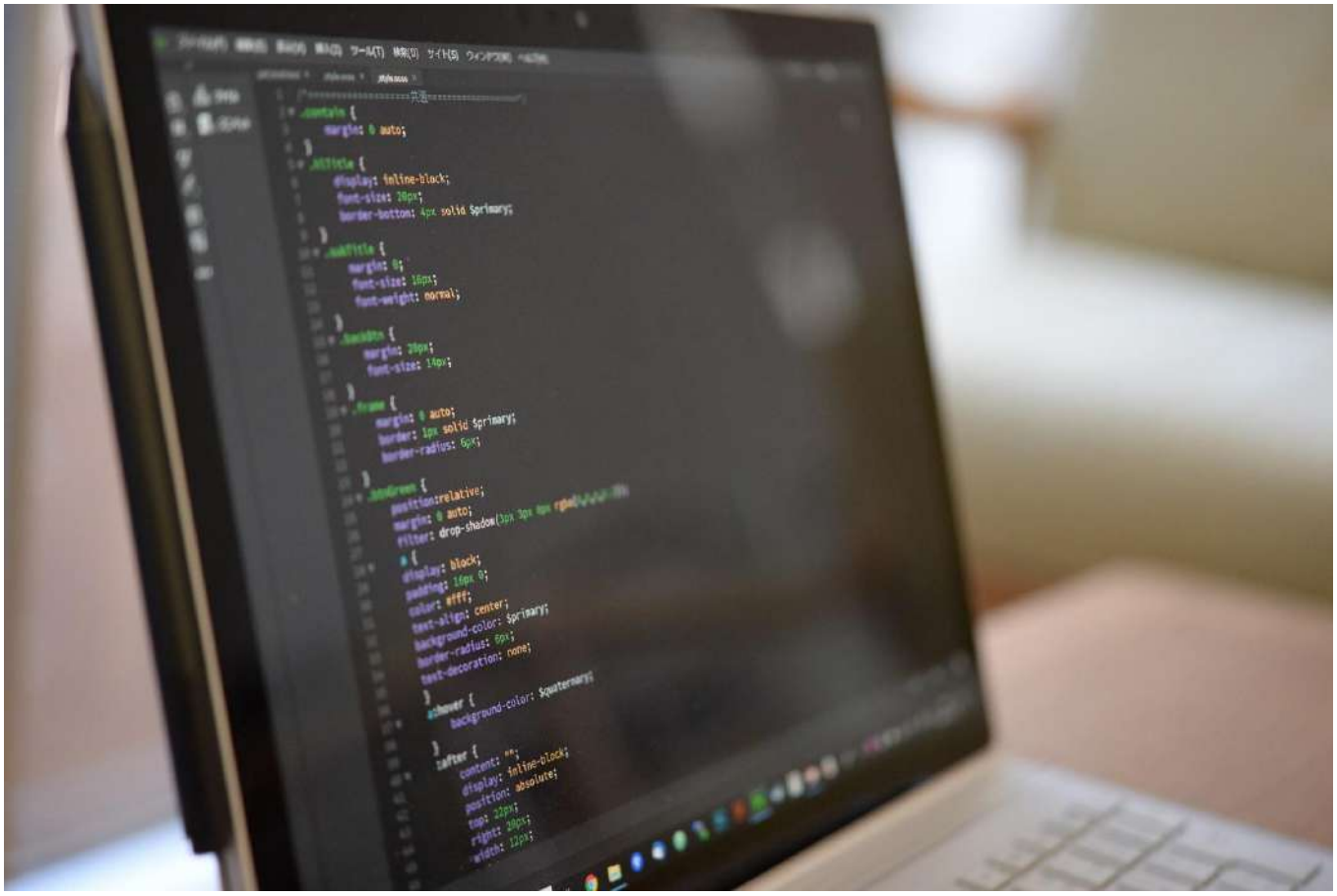
Qualification Pack



HMI/SCADA Programmer & Troubleshooter

QP Code: IAS/Q5606

NSQF Level: 4

Instrumentation Automation Surveillance & Communication Sector Skill Council
201-202 STBP NSIC Complex (Gate No. 02), Okhla Industrial Area,
New Delhi-110020

Contents

Qualification Pack

IAS/Q5606: HMI/SCADA Programmer & Troubleshooter

Brief Job Description

The individual is responsible for programming HMI/SCADA used for the controlling and monitoring various processes of industries along with finding and fixing errors / faults, if any, during the operation of the HMI/SCADA software.

Personal Attributes

This job requires discipline and attention to details, interdisciplinary aptitude and ability to learn. The person should be willing to work for long hours to meet deadlines and be able to cope with pressure.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. IAS/N5617: Develop HMI/SCADA project
2. IAS/N5618: Commission, test and troubleshoot the HMI/SCADA project on-site
3. IAS/N9001: Work effectively with teams
4. IAS/N9002: Maintain health and safety at workplace

Qualification Pack (QP) Parameters

Sector	Instrumentation Automation Surveillance and Communication
Sub-Sector	Automation
Occupation	Installation and Commissioning (Instrumentation and Automation)
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2512.0800
Minimum Educational Qualification & Experience	Diploma in Electrical/Electronics/Instrumentation/B.Sc. in Electronics
Minimum Level of Education for Training in School	NA
Pre-Requisite License or Training	NA
Minimum Job Entry Age	21 Years
Last Reviewed On	05/02/2020
Next Review Date	05/02/2024
NSQC Approval Date	NA
Version	1.0

IAS/N5617: Develop HMI/SCADA project

Description

This OS unit is about collecting information and developing HMI/SCADA project using the HMI/Scada software.

Scope

This unit/task covers the following:

- Collect information for HMI/SCADA system
- Identify HMI/Scada Software and its prerequisites
- Develop the HMI/SCADA program

Elements and Performance Criteria

Collect information for HMI/SCADA system

To be competent, the user/individual on the job must be able to:

PC1. collect detailed information about the plant and the customer's requirements regarding the type of Human Machine Interface (HMI) panel / Supervisory Control and Data Acquisition (SCADA) system needed

PC2. identify the plant layout, the plant architecture and its complexity

PC3. collect the details of input/ output list and Piping and Instrumentation Diagram (P&ID) from the plant engineer

PC4. assess the customer's needs for standard / customised layout of HMI / SCADA project, considering the distribution of process pictures

PC5. identify the type and make of the Programmable Logic Controller (PLC) used in the control panel

PC6. examine the cut-out for HMI panel on the door of the control panel

Identify HMI/Scada Software and its prerequisites

To be competent, the user/individual on the job must be able to:

PC7. identify the process of developing HMI/SCADA program using the company / organisation approved software

PC8. identify the prerequisites for software installation on PC/laptop for programming

PC9. verify the availability of other software such as office, adobe reader, windows features, etc. required for the HMI/SCADA programming

PC10. check the communication protocol to be used for communication

PC11. identify the type of communication port to use protocol compatible cable for communication between PLC and HMI/SCADA or protocol convertor in case of non-compatibility

PC12. test the communication protocol compatibility between PLC and HMI/SCADA

Develop the HMI/SCADA program

To be competent, the user/individual on the job must be able to:

PC13. create HMI/SCADA project and establish a connection with the PLC

PC14. develop the I/O tag list in the HMI/SCADA project as well as the pictures on HMI/SCADA software as per the approved distribution

PC15. create objects on the pictures as per the final P&ID and connect them with tags

PC16. formulate value and alarm storage system in the software and create backup for the same

PC17. provide security level for different users of the project

PC18. create report templates for timely report generation

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. company's code of conduct, culture, line of business, documentation policy, production policy and reporting structure

KU2. departments involved with installation and commissioning

KU3. quality and standards system followed in the company during project development

KU4. basics of computer and operating systems

KU5. standard operating procedure (SOP) of the organisation for HMI/SCADA pictures and layout development

KU6. detailed information about panels and equipment used in the HMI/SCADA project

KU7. HMI/SCADA programming software and other software for installation and debugging

KU8. piping and instrumentation diagram (P&ID)

KU9. basics of industrial process involved and their stages (example: oil and gas, refinery, etc.) as well as the infrastructure process involved in the industry (example: water treatment plant, chilling units, etc.)

KU10. sources and methods for obtaining required technical information for the HMI/SCADA project to be developed

KU11. relevant documents to be referred for optimised project development

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write and read emails, letters, technical documentation, user requirements, test reports, regulatory compliance documents schedules, timelines, diagrams and other official documents clearly

GS2. be proactive to make decisions pertaining to the scope of work

GS3. analyse the relevant factors to optimise project development

GS4. plan and organise project related to requirements, design and integration, testing, installation and commissioning, customer acceptance test and customer feedback

GS5. anticipate issues and have alternate strategy

GS6. identify needs of the customer, ask questions for clarity, and suggest most appropriate solution

GS7. discuss task lists, schedules and work-loads with customers in a simple and clear language

GS8. manage relationships and maintain good rapport with customers to get detailed inputs on logic

GS9. keep customers informed about progress of project development, achieve customer satisfaction and offer support whenever needed

GS10. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)

GS11. solve issues of co-workers who are lacking the technical know how

GS12. use the existing information for improving/optimising the project and arrive at actionable decision points

GS13. apply, analyse and evaluate the information gathered from observation, experience, reasoning or communication, as a guide to think and act accordingly

GS14. anticipate problems, risks and opportunities and utilise these for optimising PLC Program and SCADA project

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Collect information for HMI/SCADA system	**9**	**8**	**-**	**3**
PC1. collect detailed information about the plant and the customer's requirements regarding the type of Human Machine Interface (HMI) panel / Supervisory Control And Data Acquisition (SCADA) system needed	1	-	-	-
PC2. identify the plant layout, the plant architecture and its complexity	1	-	-	-
PC3. collect the details of input/ output list and Piping and Instrumentation Diagram (P&ID) from the plant engineer	1	2	-	1
PC4. assess the customer's needs for standard / customised layout of HMI / SCADA project, considering the distribution of process pictures	1	2	-	1
PC5. identify the type and make of the Programmable Logic Controller (PLC) used in the control panel	1	2	-	1
PC6. examine the cut-out for HMI panel on the door of the control panel	4	2	-	-
Prepare to develop the HMI/SCADA software	**10**	**6**	**-**	**2**
PC7. identify the process of developing HMI/SCADA program using the company / organisation approved software	2	2	-	1
PC8. identify the prerequisites for software installation on PC/laptop for programming	4	-	-	-
PC9. verify the availability of other software such as office, adobe reader, windows features, etc. required for the HMI/SCADA programming	2	2	-	1
PC10. check the communication protocol to be used for communication	2	2	-	-
Identify necessary module/ equipment for communication with software	**8**	**12**	**-**	**2**
PC11. identify the type of communication port to use protocol compatible cable for communication between PLC and HMI/SCADA or protocol convertor in case of non-compatibility	4	6	-	1
PC12. test the communication protocol compatibility between PLC and HMI/SCADA	4	6	-	1

Develop the HMI/SCADA program	**13**	**24**	**-**	**3**
PC13. create HMI/SCADA project and establish a connection with the PLC	2	4	-	-
PC14. develop the I/O tag list in the HMI/SCADA project as well as the pictures on HMI/SCADA software as per the approved distribution	3	4	-	-
PC15. create objects on the pictures as per the final P&ID and connect them with tags	2	4	-	1
PC16. formulate value and alarm storage system in the software and create backup for the same	2	4	-	1
PC17. provide security level for different users of the project	2	4	-	-
PC18. create report templates for timely report generation	2	4	-	1
NOS Total	**40**	**50**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N5617
NOS Name	Develop HMI/SCADA project
Sector	Instrumentation Automation Surveillance and Communication
Sub-Sector	Automation
Occupation	Installation and Commissioning (Instrumentation and Automation)
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	
Next Review Date	
NSQC Clearance Date	

IAS/N5618: Commission, test and troubleshoot the HMI/SCADA project on-site

Description

This OS unit is about commissioning and testing HMI/SCADA project on-site.

Scope

This unit/task covers the following:

- Upload the HMI/Scada project to panel and test its operations
- Develop the fault monitoring program
- Troubleshoot HMI/SCADA project on-site

Elements and Performance Criteria

Upload the HMI/SCADA project to panel and test its operations

To be competent, the user/individual on the job must be able to:

PC1. Upload the HMI project from laptop to the HMI panel

PC2. copy the SCADA project to plant PC at appropriate location

PC3. verify installation and operation of approved software and licenses on plant's operator PC

PC4. initiate the HMI/SCADA project in run mode

PC5. perform PLC connection, input output, and picture navigation check on HMI/SCADA system

PC6. test the animation on the pictures, values/alarms storage, security level and the report printout

Develop the fault monitoring program

To be competent, the user/individual on the job must be able to:

PC7. create objects on the HMI/SCADA project to monitor failure of PLC connection with HMI panel or PC system

PC8. develop pictures in software to monitor the performance of the PC system in SCADA project

PC9. create fault monitoring program in HMI/SCADA project for diagnosing faults in components

PC10. install recommended antivirus software to protect PC

Troubleshoot HMI/SCADA project on-site

To be competent, the user/individual on the job must be able to:

PC11. verify that proper power supply is received by the HMI panel

PC12. test the communication cable between PLC and HMI panel

PC13. check the program in HMI panel to ensure it is the latest

PC14. perform preliminary test on the HMI panel and its connection

PC15. analyse the PC system for any unwanted projects or virus

PC16. test the communication cable between PLC and PC system

PC17. transfer the latest backup to the PC system to start the project

PC18. check PLC connection and various activities in the project

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. company's reporting structure, departments involved with engineering, documentation policy, line of business, product offerings as well as quality and standards

KU2. basics of electricity, electronics, instrumentation, computer and operating systems

KU3. standard operating procedure (SOP) of the organisation for process automation HMI/SCADA testing

KU4. HMI/SCADA system and technologies used in the automation process

KU5. application software, installation, testing and debugging

KU6. general arrangement drawing and piping and instrumentation diagram (P&ID)

KU7. testing process and parameters involved in the testing

KU8. sources and methods for obtaining required technical information for the HMI/SCADA project to be tested

KU9. relevant documents to be referred for testing PLC program and SCADA project

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write and read emails, letters, technical documentation, user requirements, test reports, regulatory compliance documents schedules, timelines, diagrams and other official documents clearly

GS2. keep colleagues informed about progress of logic testing

GS3. discuss with colleagues appropriately in order to understand the nature of the problem and make a diagnosis

GS4. report issues and problems to managers in clear terms

GS5. make decisions pertaining to the scope of work and appropriate solution to faults in programming

GS6. evaluate the readiness of HMI/SCADA project for installation

GS7. plan and organise project related to requirements, design and integration, testing, installation and commissioning, customer acceptance test and customer feedback

GS8. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)

GS9. solve issues of co-workers who are lacking the technical knowledge

GS10. identify immediate or temporary solutions to resolve faults

GS11. use the existing information to optimise the project and arrive at actionable decision points

GS12. apply, analyse and evaluate the information gathered from observation, experience, reasoning or communication, as a guide to think and act accordingly

GS13. anticipate problems, risks and opportunities and utilise these for optimisation of HMI/SCADA program

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Transfer the HMI/SCADA project to panel	**17**	**16**	**-**	**5**
PC1. transfer the HMI project from laptop to the HMI panel	1	-	-	-
PC2. copy the SCADA project to plant PC at appropriate location	1	-	-	-
PC3. verify installation and operation of approved software and licenses on plant's operator PC	1	-	-	-
PC4. initiate the HMI/SCADA project in run mode	5	6	-	2
PC5. perform PLC connection, input output, and picture navigation check on HMI/SCADA system	5	6	-	2
PC6. test the animation on the pictures, values/alarms storage, security level and the report printout	4	4	-	1
Develop the fault monitoring program	**9**	**14**	**-**	**3**
PC7. create objects on the HMI/SCADA project to monitor failure of PLC connection with HMI panel or PC system	4	4	-	1
PC8. develop pictures in software to monitor the performance of the PC system in SCADA project	2	4	-	-
PC9. create fault monitoring program in HMI/SCADA project for diagnosing faults in components	1	2	-	1
PC10. install recommended antivirus software to protect PC	2	4	-	1
Troubleshoot HMI/SCADA project on-site	**14**	**20**	**-**	**2**
PC11. verify that proper power supply is received by the HMI panel	1	2	-	-
PC12. test the communication cable between PLC and HMI panel	2	4	-	-
PC13. check the program in HMI panel to ensure it is the latest	2	2	-	-
PC14. perform preliminary test on the HMI panel and its connection	2	4	-	-
PC15. analyse the PC system for any unwanted projects or virus	2	2	-	1
PC16. test the communication cable between PLC and PC system	2	2	-	-
PC17. transfer the latest backup to the PC system to start the project	2	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC18. check PLC connection and various activities in the project	1	2	-	-
NOS Total	**40**	**50**	**-**	**10**

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National Occupational Standards (NOS) Parameters

NOS Code	IAS/N5618
NOS Name	Commission, test and troubleshoot the HMI/SCADA project on-site
Sector	Instrumentation Automation Surveillance and Communication
Sub-Sector	Automation
Occupation	Installation and Commissioning (Instrumentation and Automation)
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	
Next Review Date	
NSQC Clearance Date	

IAS/N9001: Work effectively with teams

Description

This NOS unit is about working co-operatively with people and groups inside and outside the organisation, using skills to achieve the team goals and objectives, and showing respect towards all customs, preferences as well as people with disability and different genders

Scope

This unit/task covers the following:

- Work as per organisational team environment
- Communicate effectively
- Co-operate with team members and superiors
- Respect customers / preferences and gender / ability differences

Elements and Performance Criteria

Work as per the organisational team environment

To be competent, the user/individual on the job must be able to:

PC1. identify team objectives and goals, team members by name, their role and responsibilities, greet them appropriately and respond to their greetings

PC2. comply with organisation's policies and procedures for working with team members within and outside the organisation—especially related to privacy, confidentiality and security

PC3. work as per the environment to build trust and mutual respect

PC4. participate in decision making by providing facts and figures, give / accept constructive suggestions, take initiatives to help team members arrive at workable decisions and meet the goals

PC5. accept decisions professionally and support even if they do not match suggestions and personal views

Communicate effectively

To be competent, the user/individual on the job must be able to:

PC6. communicate professionally as per organisation's protocols, using appropriate mode of communication—verbal, written, mail, phone or text—and clearly articulate the message to ensure that the receiver understands the message

PC7. listen to team members attentively, respond promptly, seek / provide clarifications if required

PC8. share important information with the team timely and refrain from overloading them with unnecessary and unsolicited information

Co-operate with team members and superiors

To be competent, the user/individual on the job must be able to:

PC9. perform own role, receive inputs from others and make adjustments within permissible rules as per requirement, to produce output in time for other team members to follow

PC10. help team members to perform their role effectively and provide any clarifications/support they need, including tools /equipment / common resources as well as resolve any contentious issues amicably, involving the team lead or the supervisor if needed

PC11. let team members know in good time if commitments cannot be carried out, explaining the reasons, and provide alternate solutions, if any; let the team lead know about this

PC12. act in the interest of the team and the organisation, take initiative to correct the wrong, seek help or escalate if needed to ensure that things do not 'fall through the gap' and team goals are achieved

Respect customs / preferences and gender / ability differences

To be competent, the user/individual on the job must be able to:

PC13. follow organisation's policies and statutory guidelines w.r.t seeking information about others' customs / preferences, making references or comments on social customs / preferences, and refrain from hurting sentiments

PC14. accommodate team members' preferences to the extent feasible, and in case they come in the way of fulfilling team goals, discuss with the supervisor/ team leader

PC15. ensure personal behaviour, conduct and communication styles, taking gender and disability of the person into consideration

PC16. list the different types of disabilities with their respective issues and ways to help them overcome challenges

PC17. use inclusive language, verbal as well as non-verbal, irrespective of the disability and the gender of the person

PC18. ensure equal treatment for all clients, colleagues and co-workers while respecting their personal space

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organisation's policies on dress code, workplace timings, workplace behaviour, performance management, incentives, delivery standards, information security, etc.

KU2. organisation's hierarchy and escalation matrix

KU3. importance of the individual's role in the workflow

KU4. work area inspection procedures and practices

KU5. different types of information that colleagues might need and the importance of providing this information when it is required

KU6. deeper understanding of actions and consequences of gender based behaviour

KU7. knowledge of gender based concepts, issues and legislation

KU8. organisation standards and guidelines to be followed for PwD and knowledge about laws, acts and provisions defined for PwD by the statutory bodies and the right way to use them including various medical conditions associated with PwD

KU9. health and safety requirements at workplace for PwD and information about various institutes working for PwD to enable in providing livelihood opportunities for PwD

KU10. rights and duties at workplace with respect to PwD and various government / private schemes and benefits available for PwD

KU11. process of recruiting people for a particular job profile w.r.t PwD and gender including rights and duties at workplace with respect to gender sensitivity

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. complete forms such as work orders, invoices and maintenance records

GS2. fill up appropriate forms, activity logs and attendance sheets as per the organisation's format in English and/or local language

GS3. write basic accident or incident report as witnessed in an appropriate format to the relevant authority

GS4. read warnings, instructions and other text material on product labels, components, etc.

GS5. read relevant signage, warnings, labels or descriptions on equipment, etc. while carrying out work activities

GS6. listen effectively and orally communicate information

GS7. ask for clarification and advice from the concerned person

GS8. make decisions on a suitable course of action or response keeping in view resource utilisation while meeting

GS9. plan and organise work to achieve targets and deadlines

GS10. understand real needs of the customer and suggest most appropriate solution

GS11. support customer when needed

GS12. match symptoms of the fault noticed to the cause of the problem

GS13. anticipate and avoid hazards that may occur during repairs because of tools, materials used or repair processes

GS14. spot process disruptions and delays

GS15. practice and acceptance of gender and its concepts

GS16. develop empathy across genders and towards PwD

GS17. reflect on own gender identity, gender roles and PwD issues

GS18. engage and participate in discussions to end gender and disability discrimination

GS19. improve and modify work practices

GS20. maintain positive and effective relationships with colleagues and customers

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Work as per the organisational team environment	**15**	**8**	**-**	**5**
PC1. Identify team objectives and goals, team members by name, their role and responsibilities, greet them appropriately and respond to their greetings	4	4	-	-
PC2. comply with organisation's policies and procedures for working with team members within and outside the organisation—especially related to privacy, confidentiality and security	4	-	-	2
PC3. work as per the environment to build trust and mutual respect	2	-	-	1
PC4. participate in decision making by providing facts and figures, give / accept constructive suggestions, take initiatives to help team members arrive at workable decisions and meet the goals	4	4	-	1
PC5. accept decisions professionally and support even if they do not match suggestions and personal views	1	-	-	1
Communicate effectively	**6**	**10**	**-**	**1**
PC6. communicate professionally as per organisation's protocols, using appropriate mode of communication—verbal, written, mail, phone or text—and clearly articulate the message to ensure that the receiver understands the message	2	6	-	1
PC7. listen to team members attentively, respond promptly, seek / provide clarifications if required	2	-	-	-
PC8. share important information with the team timely and refrain from overloading them with unnecessary and unsolicited information	2	4	-	-
Co-operate with team members and superiors	**8**	**18**	**-**	**1**
PC9. perform own role, receive inputs from others and make adjustments within permissible rules as per requirement, to produce output in time for other team members to follow	2	6	-	-
PC10. help team members to perform their role effectively and provide any clarifications/support they need, including tools /equipment / common resources as well as resolve any contentious issues amicably, involving the team lead or the supervisor if needed	-	6	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. let team members know in good time if commitments cannot be carried out, explaining the reasons, and provide alternate solutions, if any; let the team lead know about this	2	-	-	-
PC12. act in the interest of the team and the organisation, take initiative to correct the wrong, seek help or escalate if needed to ensure that things do not 'fall through the gap' and team goals are achieved	4	6	-	-
Respect customs / preferences and gender / ability differences	**11**	**14**	**-**	**3**
PC13. follow organisation's policies and statutory guidelines w.r.t seeking information about others' customs / preferences, making references or comments on social customs / preferences, and refrain from hurting sentiments	2	4	-	-
PC14. accommodate team members' preferences to the extent feasible, and in case they come in the way of fulfilling team goals, discuss with the supervisor/ team leader	2	-	-	1
PC15. ensure personal behaviour, conduct and communication styles, taking gender and disability of the person into consideration	2	6	-	1
PC16. list the different types of disabilities with their respective issues and ways to help them overcome challenges	1	-	-	1
PC17. use inclusive language, verbal as well as non-verbal, irrespective of the disability and the gender of the person	2	4	-	-
PC18. ensure equal treatment for all clients, colleagues and co-workers while respecting their personal space	2	-	-	-
NOS Total	**40**	**50**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N9001
NOS Name	Work effectively with teams
Sector	Instrumentation Automation Surveillance and Communication
Sub-Sector	Automation
Occupation	Installation and Commissioning
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	20/02/2020
Next Review Date	20/02/2024
NSQC Clearance Date	

IAS/N9002: Maintain health and safety at workplace

Description

This OS unit is about following adequate safety procedures to make work environment safe

Scope

This unit/task covers the following:

- Adhere to standard safety procedures of the company
- Maintain good health and posture
- Effective waste management/recycling practices
- Adopt learning and self-direction
- Develop system thinking in problem solving
- Material/Resources conservation practices"

Elements and Performance Criteria

Adhere to standard safety procedures of the company

To be competent, the user/individual on the job must be able to:

PC1. comply with general safety procedures and those for handling an equipment, hazardous material or tool, followed in the company

PC2. remove finger rings or any other metal objects likely to interfere with the work before working on the unit

PC3. use of safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.

PC4. escalate the issue about hazardous materials or things found in the premises or any breach of safety procedure in the company

PC5. ensure zero accidents at work

PC6. avoid damage of components due to negligence in ESD procedures or any other loss due to safety negligence

PC7. participate regularly in fire drills or other safety related workshops organised by the company

Maintain good health and posture

To be competent, the user/individual on the job must be able to:

PC8. maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials

PC9. participate in company organised health sessions such as yoga, physiotherapy or games

PC10. handle heavy and hazardous materials with care, while maintaining appropriate posture, using suitable tools and handling equipment such as trolleys, jacks and ladders

Effective waste management/recycling practices

To be competent, the user/individual on the job must be able to:

PC11. identify recyclable and non-recyclable, and hazardous waste generated to be segregated accordingly

PC12. dispose non-recyclable waste and hazardous waste as per recommended processes

PC13. deposit recyclable and reusable material at identified location

Adopt learning and self-direction

To be competent, the user/individual on the job must be able to:

PC14. understand importance of skill advancement and develop mastery

PC15. adapt product / service to meet success criteria

PC16. understand accountability for timely completion of tasks

PC17. manage to express emotions in appropriate ways at workplace and understand the cause for the emotions

Develop system thinking in problem solving

To be competent, the user/individual on the job must be able to:

PC18. analyse the problem accurately and communicate different possible solutions to the problem

PC19. manage to estimate the cause of the problem and validate

Material/Resources conservation practices

To be competent, the user/individual on the job must be able to:

PC20. identify ways to optimize usage of material including water and electricity / energy in various tasks/activities/processes

PC21. check for spills/leakages in various tasks/activities/processes and plug them or escalate to appropriate authority

PC22. carry out routine cleaning of tools, machines and equipment

PC23. check if the equipment/machine is functioning normally before commencing work and rectify wherever required and report malfunctioning (fumes/sparks/emission/vibration/noise) or any lapse in maintenance of equipment

PC24. ensure electrical equipment and appliances are properly connected and turned off when not in use

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. company's policies on incentives, delivery standards, and personnel management

KU2. Company's medical policy, occupational safety and health policy, emergency evacuation procedure

KU5. how to maintain the work area safe and secure

KU6. how to handle hazardous materials, tools and equipment

KU7. procedures to be followed during emergencies such as fire accidents, electrocution, etc.

KU8. long term value of good posture and use of appropriate handling equipment

KU9. electrical grounding practices

KU10. safety regulations and standards and how to apply these

KU11. common sources of pollution and ways to minimize it

KU12. categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU13. usage of different colours of dustbins

KU14. organisation's procedures for minimizing waste, waste management and methods of waste disposal

KU16. strategies pertinent to their field such as internet searches, asking peers and managers, enrolling for courses and certifications, etc. that can be used to pursue an advancement in their skills

KU17. one should be able to identify the key performance indicators for the new tasks

KU18. seek feedback from supervisor and deal in constructive manner

KU19. understand that emotions are accompanied by a physical state, thought and feeling

KU20. one should be able to interpret timelines and goals set by the manager and break them into sub-goals and tasks

KU21. importance of quality and timely delivery of the product/service

KU22. potential hazards, risks and threats based on the nature of work

KU23. ways of efficiently managing material and water in the process

KU24. layout of the workstation and electrical and thermal equipment used

KU25. efficient and inefficient utilization of material and water

KU26. basics of electricity and prevalent energy efficient devices

KU27. ways to recognise common electrical problems

KU28. common practices of conserving electricity

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. fill up appropriate forms, activity logs and attendance sheets as per organisation's format in English and/or local language

GS2. write basic accident or incident report as witnessed in appropriate format to relevant authority

GS3. read/listen and interpret information correctly from relevant instruction documents, manuals, health and safety instructions, memos, etc. applicable to the job, in English and/or local language

GS4. read relevant signage, warnings, labels or descriptions on equipment, etc. while carrying out work activities

GS5. question co-workers in order to understand the safety and health issues

GS6. inform co-workers about safety and health issues

GS7. report issues and problems relating to safety and health to managers in clear terms

GS8. make decisions pertaining to safety and health issues at workplace

GS9. plan and organise work conforming to the safety and health norms of the company

GS10. make decisions about escalating safety and health issues at workplace to managers

GS11. discuss problems related to safety and health, evaluate the possible solution(s) and arrive at optimum /best possible solution(s) in consultation with concerned people

GS12. use the existing information to arrive at actionable decision points

GS13. use the existing information for improving customer satisfaction

GS14. use the existing information to optimise solution and company business

GS15. analyse problems and identify causes and possible solutions

GS16. apply, analyse and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action

GS17. anticipate problems, risks and opportunities and utilise these for mitigation and business optimisation

GS18. communicate with colleagues on the significance of greening of jobs

GS19. identify cause and effect of greening of jobs

GS20. record data on waste disposal at workplace

GS21. demonstrate commitment towards self, and initiative to advance skills levels by exploring various pathways to expand one's own learning

GS22. incorporate feedback into one's mental model of task, and bring it into practice

GS23. be punctual, utilize time and manage workload efficiently

GS24. evaluate strategies to maintain, enhance or reduce the intensity of heightened emotional response

GS25. test a hypothesis about the cause of the problem

GS26. identify and ask significant questions to clarify the various points of view on the problem to better understand the problem

GS27. record data on waste disposal at workplace

GS28. make timely decisions for efficient utilization of resources

GS29. complete statutory documents relevant to safety and hygiene

GS30. read Standard Operating Practices (SOP) documents

GS31. communicate with colleagues on the significance of greening of jobs

GS32. complete tasks efficiently and accurately within stipulated time

GS33. work with supervisors/team members to carry out work related tasks

GS34. identify cause and effect of greening of jobs

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Adhere to standard safety procedures of the company	**13**	**12**	**-**	**5**
PC1. comply with general safety procedures and those for handling an equipment, hazardous material or tool, followed in the company	2	2	-	1
PC2. remove finger rings or any other metal objects likely to interfere with the work before working on the unit	2	4	-	-
PC3. use of safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.	4	6	-	1
PC4. escalate the issue about hazardous materials or things found in the premises or any breach of safety procedure in the company	1	-	-	-
PC5. ensure zero accidents at work	1	-	-	1
PC6. avoid damage of components due to negligence in ESD procedures or any other loss due to safety negligence	1	-	-	1
PC7. participate regularly in fire drills or other safety related workshops organised by the company	2	-	-	1
Maintain good health and posture	**4**	**10**	**-**	**2**
PC8. maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials	2	4	-	1
PC9. participate in company organised health sessions such as yoga, physiotherapy or games	2	-	-	-
PC10. handle heavy and hazardous materials with care, while maintaining appropriate posture, using suitable tools and handling equipment such as trolleys, jacks and ladders	0	6	-	1
Effective waste management/recycling practices	**2**	**8**	**-**	**1**
PC11. identify recyclable and non-recyclable, and hazardous waste generated to be segregated accordingly	2	-	-	1
PC12. dispose non-recyclable waste and hazardous waste as per recommended processes	-	4	-	-
PC13. deposit recyclable and reusable material at identified location	-	4	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Adopt learning and self-direction	**7**	-	-	-
PC14. understand importance of skill advancement and develop mastery	2	-	-	-
PC15. adapt product / service to meet success criteria	2	-	-	-
PC16. understand accountability for timely completion of tasks	2	-	-	-
PC17. manage to express emotions in appropriate ways at workplace and understand the cause for the emotions	1	-	-	-
Develop system thinking in problem solving	**4**	-	-	-
PC18. analyse the problem accurately and communicate different possible solutions to the problem	2	-	-	-
PC19. manage to estimate the cause of the problem and validate	2	-	-	-
Material/Resources conservation practices	**10**	**20**	-	**2**
PC20. identify ways to optimize usage of material including water and electricity / energy in various tasks/activities/processes	2	2	-	-
PC21. check for spills/leakages in various tasks/activities/processes and plug them or escalate to appropriate authority	2	-	-	1
PC22. carry out routine cleaning of tools, machines and equipment	2	6	-	1
PC23. check if the equipment/machine is functioning normally before commencing work and rectify wherever required and report malfunctioning (fumes/sparks/emission/vibration/noise) or any lapse in maintenance of equipment	2	6	-	-
PC24. ensure electrical equipment and appliances are properly connected and turned off when not in use	2	6	-	-
NOS Total	**40**	**50**	-	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	IAS/N9002
NOS Name	Maintain health and safety at workplace
Sector	Instrumentation Automation Surveillance and Communication
Sub-Sector	Automation
Occupation	Installation and Commissioning
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	20/02/2020
Next Review Date	20/02/2024
NSQC Clearance Date	

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for the 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 these criteria.
6. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of % aggregate marks to successfully clear the assessment.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Recommended Pass % aggregate for QP: 70

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
IAS/N5617: Develop HMI/SCADA project	40	50	-	10	100	25
IAS/N5618: Commission, test and troubleshoot the HMI/SCADA project on-site	40	50	-	10	100	25
IAS/N9001: Work effectively with teams	40	50	-	10	100	25
IAS/N9002: Maintain health and safety at workplace	40	50	-	10	100	25
Total	**160**	**200**	**-**	**40**	**400**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements that together specify the technical, generic, professional and organisational specific knowledge that an individual need in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.

Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication-related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.