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Islamabad

INDUSTRIAL AUTOMATION

ASSESSMENT PACKAGE

National Vocational Certificate Level 4

Version 1 - July, 2019

NAVTTC

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Published by
National Vocational and Technical Training Commission
Government of Pakistan

Headquarter
Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
www.navttc.org

Responsible
Director General Skills Standard and Curricula, National Vocational and Technical Training Commission
National Deputy Head, TVET Sector Support Programme, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Layout & design
SAP Communications

Photo Credits
TVET Sector Support Programme

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This document has been produced with the technical assistance of the TVET Sector Support Programme, which is funded by the European Union, the Federal Republic of Germany and the Royal Norwegian Embassy and has been commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in close collaboration with the National Vocational and Technical Training Commission (NAVTTC) as well as provincial Technical Education and Vocational Training Authorities (TEVTAs), Punjab Vocational Training Council (PVTC), Qualification Awarding Bodies (QABs)s and private sector organizations.

Document Version
July, 2019
Islamabad, Pakistan

INDUSTRIAL AUTOMATION

ASSESSMENT PACKAGE

National Vocational Certificate Level 4

Version 1 - July, 2019

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 01
Competency Standard Title: A:Configure AC Drives and Motors D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 1 hour		

Guidance for Candidate	**To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.**

Assessors Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: Candidate Signature:..... .....
Written Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: Signature of the Assessor:..... .....

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 01
Competency Standard Title: A:Configure AC Drives and Motors D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 1 hour		

WRITTEN ASSESSMENT

Question	**Candidate's answer**
1. Explain the function of variable frequency drive in the operation of AC Motors.	
2. What is the relation between frequency and speed of an AC Motor?	
3. Which methods are generally used to control the speed of a motor?	
4. Enlist different control modes of VFD.	
5. What is acceleration and deceleration time?	
6. Enlist different communication ports of servo drives.	
7. What is the main difference between servo motor and induction motor?	
8. What is the rotary encoder?	

Question	Candidate's answer
9. What are safety procedures in the workplace?	
10. Enlist any five training skills?	
11. Define safe work procedures?	
12. How do you write minutes of a meeting?	

ANSWER KEY

Sr.	Answers
1	The Variable Frequency Drive is a type of adjustable speed drive. It controls the frequency of electrical power supplied to ac motors to adjust their speed.
2	N(speed) = 120 f / P
3	• Variable voltage • Variable frequency
4	• Speed control using parameters • Speed control using external terminals • Speed control using PLC • Torque control • Multispeed functions • Soft start and soft stop etc
5	VFD acceleration time is the time required by output frequency from 0 Hz to the maximum frequency, deceleration time is from maximum frequency dropped to 0 Hz.
6	• Encoder port for feedback • Communication port to connect with controller • Ethernet port to connect with PC
7	Servo motor is generally used for precise positions. Whereas induction motors are used in heavy loading where accuracy is not vital.
8	Rotary encoder is used to determine the position of rotating shaft generally used in built-in servo system but can be used separately as well.
9	Safe work practices are generally written methods that define how tasks are performed while minimizing risks to people, equipment, materials, environment, and processes. Safe work procedures are documented procedures for performing tasks.
10	• Advanced research skills. • Strong communication skills. • Flexible organization skills. • Enthusiasm for lifelong learning. • Content authoring tool. • Video editing software. • Social media. • Learning Management System.
11	Safe Work Procedures are documented procedures for performing tasks.
12	• The names of the participants. • Agenda items. • Calendar or due dates. • Actions or tasks. • The main points. • Decisions made by the participants. • Record what are the most important points? • Future decisions.

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code: 071400940	Level: 4	Version: 01
Competency Standard Title: A:Configure AC Drives and Motors D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 4 hours		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** 1. **Assessment Task 1:** Candidate is required to perform wiring of motor and drive with selection of necessary tools, as per given instructions by assessor, and troubleshoot it. 2. **Assessment Task 2:** Candidate is required to control the speed / directions / position of motors by setting parameter in drives as per given instruction by assessor. 3. **Assessment Task 3:** Candidate is required to interface drive with PLC and troubleshoot different problems as per given instruction by assessor. 4. **Assessment Task 4:** Candidate is required to control the speed / directions/ torque / position of motors using PLC interfacing with servo drive as per given instruction by assessor. 5. **Assessment Task 5:** Candidate is required to control the speed / directions / torque of motors using PLC interfacing with VFD as per given instruction by assessor. **And complete:** 6. **Knowledge assessment test (Written or Oral)** 7. **Portfolios at the time of assessment (if any)**

Minimum Evidence Required	**During a practical assessment, under observation by an assessor, you will complete:** **Assessment Task 1** Performance Criteria 1: Select tools, motors and drives as per requirement Performance Criteria 2: Perform wiring of motor, drives and controllers as per requirement Performance Criteria 3: Troubleshoot motor and drives Performance Criteria 4: Complete work tasks within deadlines in according to order of priority Performance Criteria 5: Supervisors are informed of any delays in work times or projects Performance Criteria 6: Use technology efficiently and effectively to manage work priorities and commitments Performance Criteria 7: Identify and report emergency incidents Performance Criteria 8: Practice organizational policy and procedures for responding to emergency incidents Performance Criteria 9: Identify and implement workplace procedures and work instructions for controlling risks Performance Criteria 10: Use different modes of communication to communicate • Speaking • Reading • Writing • Listening • Presentation • visual representation etc Performance Criteria 11: Plan steps to complete tasks. Performance Criteria 12: Review planning and organizing process.
	Assessment Task 2 Performance Criteria 1: Set parameters of drives and controller as per requirement. Performance Criteria 2: Supervisors are informed of any delays in work times or projects Performance Criteria 3: Assess personal knowledge and skills against competency Performance Criteria 4: Identify and report emergency incidents Performance Criteria 5: Review planning and organizing process.

	Assessment Task 3 Performance Criteria 1: Identify communication protocols of drives and controllers as per requirement. Performance Criteria 2: Interface encoders with PLC and drives as per requirement. Performance Criteria 3: Troubleshoot drives communication. Performance Criteria 4: Complete work tasks within deadlines in according to order of priority Performance Criteria 5: Use technology efficiently and effectively to manage work priorities and commitments Performance Criteria 6: Identify and report emergency incidents Performance Criteria 7: Plan steps to complete tasks.
	Assessment Task 4 Performance Criteria 1: Control Servo Operation using PLC as per requirement. Performance Criteria 2: Identify and report emergency incidents Performance Criteria 3: Practice organizational policy and procedures for responding to emergency incidents Performance Criteria 4: Identify and report emergency incidents Performance Criteria 5: Identify task requirements.
	Assessment Task 5 Performance Criteria 1: Control Variable Frequency Drive (VFD) operation using PLC as per requirement. Performance Criteria 2: Identify and implement workplace procedures and work instructions for controlling risks Performance Criteria 3: Organize work.

Continued on following page

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment	✓	✓					
Other Requirement							
Each Assessment Task (with performance criteria)							

Assessment Task 1	Description of assessment task 1 Candidate is required to perform wiring of motor and drive with selection of necessary tools, as per given instructions by assessor, and troubleshoot it.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Select tools, motors and drives as per requirement			
2	Perform wiring of motor, drives and controllers as per requirement			
3	Troubleshoot motor and drives			
4	Complete work tasks within deadlines in according to order of priority			
5	Supervisors are informed of any delays in work times or projects			
6	Use technology efficiently and effectively to manage work priorities and commitments			
7	Identify and report emergency incidents			
8	Practice organizational policy and procedures for responding to emergency incidents			
9	Identify and implement workplace procedures and work instructions for controlling risks			
10	Use different modes of communication to communicate • Speaking • Reading • Writing • Listening • Presentation • visual representation etc			
11	Plan steps to complete tasks.			
12	Review planning and organizing process.			

Competent ☐	Not Yet Competent ☐

Assessment Task 2	Description of assessment task 2 Candidate is required to control the speed / directions / position of motors by setting parameter in drives as per given instruction by assessor.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Set parameters of drives and controller as per requirement.			
2	Supervisors are informed of any delays in work times or projects			
3	Assess personal knowledge and skills against competency			
4	Identify and report emergency incidents			
5	Review planning and organizing process.			

Competent ☐	Not Yet Competent ☐

Assessment Task 3	Description of assessment task 3 Candidate is required to interface drive with PLC and troubleshoot different problems as per given instruction by assessor.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Identify communication protocols of drives and controllers as per requirement.			
2	Interface encoders with PLC and drives as per requirement.			
3	Troubleshoot drives communication.			
4	Complete work tasks within deadlines in according to order of priority			
5	Use technology efficiently and effectively to manage work priorities and commitments			
6	Identify and report emergency incidents			
7	Plan steps to complete tasks.			

Competent ☐	Not Yet Competent ☐

Assessment Task 4	Description of assessment task 4 Candidate is required to control the speed / directions/ torque / position of motors using PLC interfacing with servo drive as per given instruction by assessor..

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Control Servo Operation using PLC as per requirement.			
2	Identify and report emergency incidents			
3	Practice organizational policy and procedures for responding to emergency incidents			
4	Identify and report emergency incidents			
5	Identify task requirements			
Competent ☐		Not Yet Competent ☐		

Assessment Task 5	Description of assessment task 5 Candidate is required to control the speed / directions / torque of motors using PLC interfacing with VFD as per given instruction by assessor.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Control Variable Frequency Drive (VFD) operation using PLC as per requirement.			
2	Identify and implement workplace procedures and work instructions for controlling risks			
3	Organize work.			
Competent ☐		Not Yet Competent ☐		

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code: 071400941	Level: 4	Version: 01
Competency Standard Title: B: Operate Industrial Robot D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 4 hours		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** 8. **Assessment Task 1:** Candidate is required to select appropriate tools, accessories, safety gear and instruction manuals to correctly install the industrial robot; safely connect cables, pneumatic/hydraulic systems and peripherals as per the required installation activity. 9. **Assessment Task 2:** Candidate is required to develop a suitable program for a given robotic activity by using both teach-pendant and programming software, in addition to simulating the task before the final execution. **And complete:** **10. Knowledge assessment test (Written or Oral)** **11. Portfolios at the time of assessment (if any)**
Minimum Evidence Required	**During a practical assessment, under observation by an assessor, you will complete:** **Assessment Task 1** Performance Criteria 1: Select tools & accessories as per requirement Performance Criteria 2: Connect cables and peripheral as per requirement Performance Criteria 3: Integrate pneumatic / hydraulic system with robot as per requirement Performance Criteria 4: Take safety measures as per requirement Performance Criteria 5: Complete work tasks within deadlines in according to order of priority Performance Criteria 6: Identify and implement workplace procedures and work instructions for controlling risks Performance Criteria 7: Identify task requirements. Performance Criteria 8: Plan steps to complete tasks. Performance Criteria 9: Review planning and organizing process. Organize work.

	Assessment Task 2 Performance Criteria 1: Develop program using Teach Pendant (online) Performance Criteria 2: Simulate Robot Program as per requirement. Performance Criteria 3: Develop program using Robots Software (offline) Performance Criteria 4: Assess personal knowledge and skills against competency Performance Criteria 5: Identify and report emergency incidents Performance Criteria 6: Use different modes of communication to communicate • Speaking • Reading • Writing • Listening • Presentation • visual representation etc
	Portfolios required at the time of assessment for Performance criteria 1 for the evaluation of portfolio: A comprehensive report on a given industrial robot (collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used). Performance criteria 2 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 3 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 4 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 5 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 6 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 7 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 8 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 9 for the evaluation of portfolio: A comprehensive report on a given industrial robot Performance criteria 10 for the evaluation of portfolio: A comprehensive report on a given industrial robot

Continued on following page

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓	✓			
Knowledge Assessment	✓	✓					
Other Requirement							

Each Assessment Task (with performance criteria)	
Assessment Task 1	Description of assessment task 1 Candidate is required to select appropriate tools, accessories, safety gear and instruction manuals to correctly install the industrial robot; safely connect cables, pneumatic/hydraulic systems and peripherals as per the required installation activity.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Select tools & accessories as per requirement			
2	Connect cables and peripheral as per requirement			
3	Integrate pneumatic / hydraulic system with robot as per requirement			
4	Take safety measures as per requirement			
5	Complete work tasks within deadlines in according to order of priority			
6	Identify and implement workplace procedures and work instructions for controlling risks			
7	Identify task requirements.			
8	Plan steps to complete tasks.			
9	Review planning and organizing process.			
10	Organize work.			

Competent ☐	Not Yet Competent ☐

Assessment Task 2	Description of assessment task 2 Candidate is required to develop a suitable program for a given robotic activity by using both teach-pendant and programming software, in addition to simulating the task before the final execution.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Develop program using Teach Pendant (online)			
2	Simulate Robot Program as per requirement.			
3	Develop program using Robots Software (offline)			
4	Assess personal knowledge and skills against competency			
5	Identify and report emergency incidents			
6	Use different modes of communication to communicate • Speaking • Reading • Writing • Listening • Presentation • Visual representation etc			
Competent ☐		Not Yet Competent ☐		

Portfolio (if any)	Description of portfolio • A comprehensive report on a given industrial robot, collected over the full duration of the module; the details on robot configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used.

Current ☐ Sufficient ☐ Authentic ☐ Valid ☐ Reliable ☐

Portfolio meet the following performance standards:		Yes	No	Remarks
1	Select tools & accessories as per requirement			
2	Connect cables and peripheral as per requirement			
3	Integrate pneumatic / hydraulic system with robot as per requirement			
4	Take safety measures as per requirement			
5	Develop program using Teach Pendant (online)			
6	Simulate Robot Program as per requirement.			
7	Develop program using Robots Software (offline)			
8	Select Tools as per requirement			
9	Edit and debug a program using Teach Pendant /Software			
10	Troubleshoot Control Panel and Drives			

Competent ☐	Not Yet Competent ☐

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 01
Competency Standard Title: B: Operate Industrial Robot D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 1 hour		

Guidance for Candidate	**To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.**

Assessors Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: Candidate Signature:..... .....
Written Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: Signature of the Assessor:..... .....

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 01
Competency Standard Title: B: Operate Industrial Robot D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 1 hour		

WRITTEN ASSESSMENT

Question	**Candidate's answer**
13. Define Industrial Robots?	
14. Enlist most commonly used robot configurations in industrial settings?	
15. Define the work envelope?	
16. What happens when robot faces singularity (or singular configuration)?	
17. How many degrees of freedom (DOF) are there in ---------- Robot?	
18. What is the End Effector?	
19. Differentiate between programming through Teach Pendant and Robot Software	

Question	Candidate's answer
20. Enlist most common applications of Industrial Robots?	
21. Write any six professional skills?	
22. What is the meaning of Minutes?	
23. Enlist any five emergency incidents?	
24. Why is training needed in the workplace?	

ANSWER KEY

Sr.	Answers
1	Industrial robot is a multi-purpose programmable manipulator. It can do different jobs; it can be programmed and re-programmed; and it can manipulate the objects using its end-effector.
2	1. PUMA configuration (6 DOF Articulating robot) 2. SCARA robot 3. Stanford Arm 4. Etc.
3	Work envelop is the volume in which robot can move and perform the assigned task. An industrial robot cannot do a job out of its work-envelop.
4	The controller of the robot is unable to solve the mathematical model of the robot. The end-effector is unable to reach the desired position.
5	SCARA robot (4 DOF) PUMA robot (6 DOF) Stanford robot (6 DOF) Etc.
6	End-effector is connected to the end of robotic manipulator and used to perform different tasks by the robot. The end-effector can be 1. Two fingered gripper 2. Three fingered gripper 3. Welding tool 4. Tool with vacuum suction cup 5. Testing probe Etc.
7	Teach Pendant 1. Handheld device 2. Positions are recorded through 3. Limited Control and operation modes 4. Useful for minor changes in robot program Robot Software 1. Installed on Workstation/PC 2. Positions may be recorded through in-software visualization 3. Detailed control and operation modes 4. Useful for major changes in robot program Other similar differences may also be listed.
8	1. Welding a. Spot welding b. Arc welding 2. Pick and Place 3. Painting 4. Assembly 5. Sorting 6. Packaging 7. etc.
9	• Communication. • Ability to Work under Pressure • Decision Making • Time Management • Self-motivation

	• Conflict Resolution • Leadership • Adaptability
10	A record of a meeting including its discussions, decisions and resolutions.
11	• Natural disasters • Explosions • Fire • Hazardous chemicals • Bomb threats • Armed attacks • An employee is injured in the workplace • Suffers an illness in the workplace
12	Training is the process of enhancing the skills, capabilities and knowledge of employees for doing a particular job.

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 01
Competency Standard Title: A: Configure AC Drives and Motors B: Operate Industrial Robot C: Contribute to Work Related Health and Safety (WHS) Initiatives D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 1hour		

Guidance for Candidate	**To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.**

Assessors Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: Candidate Signature:..... .....
Written Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: Signature of the Assessor:..... .....

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 01
Competency Standard Title: A: Configure AC Drives and Motors B: Operate Industrial Robot D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 1 hours		

WRITTEN ASSESSMENT

Question	**Candidate's answer**
1. What is the meaning of Minutes?	
2. Enlist any five emergency incidents?	
3. Write any six professional skills?	
4. What is Job sheet?	
5. What are safety procedures in the workplace?	
6. What is the rotary encoder?	
7. Enlist different communication ports of servo drives.	
8. Enlist different control modes of VFD.	

Question	Candidate's answer
9. What is the End Effector?	
10. Enlist the types of End Effector?	
11. What happens when robot faces singularity (or singular configuration)?	
12. Define the work envelope?	
13. What are three factors affect health and safety?	
14. What are the OHS policies and procedures?	

ANSWER KEY

Sr.	Answers
1	A record of a meeting including its discussions, decisions and resolutions.
2	• Natural disasters • Explosions • Fire • Hazardous chemicals • Bomb threats • Armed attacks • An employee is injured in the workplace • Suffers an illness in the workplace
3	• Communication. • Ability to Work under Pressure • Decision Making • Time Management • Self-motivation • Conflict Resolution • Leadership • Adaptability
4	A *job sheet* is a document (usually just a page) containing instructions to help a worker do his *job*. It also contains details such as time it takes to perform a *job* and the materials needed or used for a *job.* Some *job sheets* have blank quantity for the worker to fill up during or after performing the *job.*
5	Safe work practices are generally written methods that define how tasks are performed while minimizing risks to people, equipment, materials, environment, and processes. Safe work procedures are documented procedures for performing tasks.
6	Rotary encoder is used to determine the position of rotating shaft generally used in built-in servo system but can be used separately as well.
7	• Encoder port for feedback • Communication port to connect with controller • Ethernet port to connect with PC
8	• Speed control using parameters • Speed control using external terminals • Speed control using PLC • Torque control • Multispeed functions • Soft start and soft stop etc
9	End-effector is connected to the end of robotic manipulator and used to perform different tasks by the robot.
10	The end-effector can be 6. Two fingered gripper 7. Three fingered gripper 8. Welding tool 9. Tool with vacuum suction cup 10. Testing probe etc.
11	The controller of the robot is unable to solve the mathematical model of the robot. The end-effector is unable to reach the desired position.
12	Work envelop is the volume in which robot can move and perform the assigned task. An industrial robot cannot do a job out of its work-envelop.
13	• Assess the risks • Decide on necessary precautions • Prevent or adequately control exposure

	• Ensure use and maintenance of control measures • Monitor exposure • Carry out appropriate health surveillance • Prepare plans and procedures for accidents, incidents and emergencies
14	The purpose of the Health and Safety policies and procedures is to guide and direct all employees to work safely and prevent injury, to themselves and others. All employees are encouraged to participate in developing, implementing, and enforcing Health and Safety policies and procedures.

Title of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technician)	CS Code:	Level: 4	Version: 01
Competency Standard Title: A: Configure AC Drives and Motors C: Contribute to Work Related Health and Safety (WHS) Initiatives D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment time:** 4hrs		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** **12. Assessment Task 1:** Candidate is required to control speed, direction and torque of induction motor using VFD by; • Parameter setting by Key pad • External resource • PLC **13. Assessment Task 2:** Candidate is required to control speed, direction, position and torque of servo motor using servo drive by; • Parameter setting by Key pad • External resource • PLC • PC using software 14. **Assessment Task 3:** Candidate is required to control the position of induction motor where • Encoder will be used for feedback. • Read the pulses of encoder in PLC. • Control the VFD through PLC. • Control the position of the motor using VFD. **And complete:** **15. Knowledge assessment test (Written or Oral)** **16. Portfolios at the time of assessment (if any)**

Minimum Evidence Required	**During a practical assessment, under observation by an assessor, you will complete:** **Assessment Task 1** Performance Criteria 1: Select tools, motors and drives as per requirement. Performance Criteria 2: Perform wiring of motor, drives and controllers as per requirement. Performance Criteria 3: Set parameters of drives and controller as per requirement. Performance Criteria 4: Troubleshoot motor and drives. Performance Criteria 5: Identify communication protocols of drives and controllers as per requirement Performance Criteria 6: Control Variable Frequency Drive (VFD) operation using PLC as per requirement Performance Criteria 7: Troubleshoot drives communication Performance Criteria 8: Complete work tasks within deadlines in according to order of priority Performance Criteria 9: Supervisors are informed of any delays in work times or projects Performance Criteria 10: Use technology efficiently and effectively to manage work priorities and commitments Performance Criteria 11: Assess personal knowledge and skills against competency Performance Criteria 12: Identify and report emergency incidents Performance Criteria 13: Identify and implement workplace procedures and work instructions for controlling risks Performance Criteria 14: Identify task requirements. Performance Criteria 15: Plan steps to complete tasks. Performance Criteria 16: Review planning and organizing process. Performance Criteria 17: Organize work.
	Assessment Task 2 Performance Criteria 1: Select tools, motors and drives as per requirement. Performance Criteria 2: Perform wiring of motor, drives and controllers as per requirement. Performance Criteria 3: Set parameters of drives and controller as per requirement. Performance Criteria 4: Troubleshoot motor and drives. Performance Criteria 5: Identify communication protocols of drives and controllers as per requirement Performance Criteria 6: Control Servo Operation using PLC as per requirement Performance Criteria 7: Troubleshoot drives communication Performance Criteria 8: Complete work tasks within deadlines in according to order of priority

	Assessment Task 3 Performance Criteria 1: Interface encoders with PLC and drives as per requirement Performance Criteria 2: Identify and implement workplace procedures and work instructions for controlling risks Performance Criteria 3: Assess personal knowledge and skills against competency Performance Criteria 4: Take initiative to prioritize and facilitate competing demands to achieve organizational goals and objectives Performance Criteria 5: Use different modes of communication to communicate e.g.: presentation, speaking, writing, listening, visual representation, reading etc
	Portfolios required at the time of assessment (if any) for Performance criteria 1 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 2 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 3 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 4for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 5 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 6 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 7 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 8 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 9 for the evaluation of portfolio: Report on health and safety measures and initiatives in Automation industry. Performance criteria 10 for the evaluation of portfolio: Report on Workplace training Performance criteria 11 for the evaluation of portfolio: Report on Workplace training Performance criteria12 for the evaluation of portfolio: Report on Workplace training Performance criteria 13 for the evaluation of portfolio: Report on Workplace training Performance criteria 14 for the evaluation of portfolio: Report on Workplace training Performance criteria 15 for the evaluation of portfolio: Report on Workplace training Performance criteria 16 for the evaluation of portfolio: Report on Workplace training Performance criteria 17 for the evaluation of portfolio: Report on Workplace training

Continued on following page

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor:..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment	✓	✓					
Other Requirement				✓			

Each Assessment Task (with performance criteria)	
Assessment Task 1	Description of assessment task 1 Candidate is required to control speed, direction and torque of induction motor using VFD by; • Parameter setting by Key pad • External resource • PLC

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Select tools, motors and drives as per requirement.			
2	Perform wiring of motor, drives and controllers as per requirement.			
3	Set parameters of drives and controller as per requirement.			
4	Troubleshoot motor and drives.			
5	Identify communication protocols of drives and controllers as per requirement			
6	Control Variable Frequency Drive (VFD) operation using PLC as per requirement			
7	Troubleshoot drives communication			
8	Complete work tasks within deadlines in according to order of priority			
9	Supervisors are informed of any delays in work times or projects			
10	Use technology efficiently and effectively to manage work priorities and commitments			
11	Assess personal knowledge and skills against competency			
12	Identify and report emergency incidents			
13	Identify and implement workplace procedures and work instructions for controlling risks			
14	Identify task requirements			
15	Plan steps to complete tasks			
16	Review planning and organizing process			
17	Organize work			
Competent ☐		Not Yet Competent ☐		

Assessment Task 2	Description of assessment task 2 Candidate is required to control speed, direction, position and torque of servo motor using servo drive by; • Parameter setting by Key pad • External resource • PLC • PC using software

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Select tools, motors and drives as per requirement.			
2	Perform wiring of motor, drives and controllers as per requirement.			
3	Set parameters of drives and controller as per requirement.			
4	Troubleshoot motor and drives.			
5	Identify communication protocols of drives and controllers as per requirement			
6	Control Servo Operation using PLC as per requirement			
7	Troubleshoot drives communication			
8	Complete work tasks within deadlines in according to order of priority			

Competent ☐	Not Yet Competent ☐

Assessment Task 3	Description of assessment task 3 Candidate is required to control the position of induction motor where; • Encoder will be used for feedback. • Read the pulses of encoder in PLC. • Control the VFD through PLC. • Control the position of the motor using VFD.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Interface encoders with PLC and drives as per requirement			
2	Identify and implement workplace procedures and work instructions for controlling risks			
3	Assess personal knowledge and skills against competency			
4	Take initiative to prioritize and facilitate competing demands to achieve organizational goals and objectives			
5	Use different modes of communication to communicate e.g.: presentation, speaking, writing, listening, visual representation, reading etc			

Competent ☐	Not Yet Competent ☐

Portfolio (if any)	Description of portfolio • Report on health and safety measures and initiatives in Automation industry. • Report on Workplace training

Current ☐ Sufficient ☐ Authentic ☐ Valid ☐ Reliable ☐

Portfolio meet the following performance standards:		Yes	No	Remarks
1	Compile database on work-related health and safety			
2	Identify measures that address legal obligations.			
3	Consult with individuals/ parties to formulate measures and initiatives			
4	Consult with individuals/parties to identify factors impacting on work-related health and safety			
5	Participate in consultative meetings.			
6	Assist in planning of work-related health and safety measures			
7	Contribute to the development of work-related health and safety measures			
8	Identify to implement work-related health and safety measures i.e. • resourcing requirements, • timelines • responsibilities			
9	Assist to implement work-related health and safety measures and initiatives i.e. • Scheduling • Liaison • Administering resources • Communication			
10	Assess the need for training			
11	Prepare trainees for the learning experience			
12	Present training session			
13	Support trainees in managing their own learning			
14	Facilitate group learning			
15	Provide opportunity for practice			
16	Provide feedback on progress on trainees			
17	Review delivery experience			

Competent ☐	Not Yet Competent ☐

itle of Qualification: National Vocational Certificate Level 4 in Industrial Automation (Senior Automation Technicians)	CS Code:	Level: 4	Version: 1
Competency Standard Title: B: Operate Industrial Robot D: Analysis Workplace Policy and Procedures E: Perform Advanced Communication	**Assessment Date (DD/MM/YY):** **Assessment Time :** 4 hours		

Candidate Details	Name: ..... Registration/Roll Number: .....
Guidance for Candidate	**To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment):** 17. **Assessment Task 1:** Candidate is required to select appropriate tools, accessories and safety gear and instruction manuals to correctly install the industrial robot; safely connect cables, pneumatic/hydraulic systems and peripherals as per the required installation activity. 18. **Assessment Task 2:** Candidate is required to develop a suitable program for a given robotic activity by using both teach-pendant and programming software, in addition to simulating the task before the final execution. 19. **Assessment Task 3:** Candidate is required to troubleshoot the pre-selected induced fault of an industrial robot by selecting appropriate tools, software and hardware. **And complete:** **20. Knowledge assessment test (Written or Oral)** **21. Portfolios at the time of assessment (if any)**
Minimum Evidence Required	**During a practical assessment, under observation by an assessor, you will complete:** **Assessment Task 1** Performance Criteria 1: Select tools & accessories as per requirement Performance Criteria 2: Connect cables and peripheral as per requirement Performance Criteria 3: Integrate pneumatic / hydraulic system with robot as per requirement Performance Criteria 4: Take safety measures as per requirement Performance Criteria 5: Complete work tasks within deadlines in according to order of priority Performance Criteria 6: Supervisors are informed of any delays in work times or projects

	Assessment Task 2 Performance Criteria 1: Develop program using Teach Pendant (online) Performance Criteria 2: Simulate Robot Program as per requirement. Performance Criteria 3: Develop program using Robots Software (offline) Performance Criteria 4: Identify task requirements. Performance Criteria 5: Plan steps to complete tasks. Performance Criteria 6: Review planning and organizing process. Performance Criteria 7: Organize work.
	Assessment Task 3 Performance Criteria 1: Select Tools as per requirement Performance Criteria 2: Edit and debug a program using Teach Pendant /Software Performance Criteria 3: Troubleshoot Control Panel and Drives Performance Criteria 4: Use technology efficiently and effectively to manage work priorities and commitments Performance Criteria 5: Assess personal knowledge and skills against competency

	Portfolios required at the time of assessment for Performance criteria 1: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 2: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 3: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 4: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 5: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 6: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 7: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 8: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 9: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used. Performance criteria 10: A comprehensive report on a given industrial robot, collected over the full duration of the module, detailing its configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used.

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Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature:..... .....
Assessment Outcome	COMPETENT ☐ NOT YET COMPETENT ☐ Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor:..... .....

Assessment Summary (to be filled by the assessor)							
Activity	**Method**					**Result**	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓	✓			
Knowledge Assessment	✓	✓					
Other Requirement							

Each Assessment Task (with performance criteria)	
Assessment Task 1	Description of assessment task 1 Candidate is required to select appropriate tools, accessories, and safety gear and instruction manuals to correctly Install the industrial robot specified by your assessor to meet required specifications.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Select tools & accessories as per requirement			
2	Connect cables and peripheral as per requirement			
3	Integrate pneumatic / hydraulic system with robot as per requirement			
4	Take safety measures as per requirement			
5	Complete work tasks within deadlines in according to order of priority			
6	Supervisors are informed of any delays in work times or projects			
Competent ☐		Not Yet Competent ☐		

Assessment Task 2	Description of assessment task 2 Candidate is required to develop a suitable program for a given robotic activity by using both teach-pendant and programming software, in addition to simulating the task before the final execution.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Develop program using Teach Pendant (online)			
2	Simulate Robot Program as per requirement.			
3	Develop program using Robots Software (offline)			
4	Identify task requirements.			
5	Plan steps to complete tasks.			
6	Review planning and organizing process.			
7	Organize work.			
Competent ☐		Not Yet Competent ☐		

Assessment Task 3	Description of assessment task 3 Candidate is required to troubleshoot the pre-selected induced fault of an industrial robot by selecting appropriate tools, software and hardware.

During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1	Select Tools as per requirement			
2	Edit and debug a program using Teach Pendant /Software			
3	Troubleshoot Control Panel and Drives			
4	Assess personal knowledge and skills against competency			
5	Use technology efficiently and effectively to manage work priorities and commitments			
Competent ☐		Not Yet Competent ☐		

Portfolio (if any)	Description of portfolio A comprehensive report on a given industrial robot, collected over the full duration of the module; The details on robot configurations, joint-types, work-envelope, singularities (if any), attached teach pendant and robot software. It must also indicate the typical applications for which such robots are used.

Current ☐ Sufficient ☐ Authentic ☐ Valid ☐ Reliable ☐

Portfolio meet the following performance standards:		Yes	No	Remarks
1	Select tools & accessories as per requirement			
2	Connect cables and peripheral as per requirement			
3	Integrate pneumatic / hydraulic system with robot as per requirement			
4	Take safety measures as per requirement			
5	Develop program using Teach Pendant (online)			
6	Simulate Robot Program as per requirement.			
7	Develop program using Robots Software (offline)			
8	Select Tools as per requirement			
9	Edit and debug a program using Teach Pendant /Software			
10	Troubleshoot Control Panel and Drives			

Competent ☐	Not Yet Competent ☐

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