

QUALIFICATION FILE

< Robotics & Automation Engineer >

☒ Short Term Training (STT) ☐ Long Term Training (LTT) ☐ Apprenticeship

☐ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

☐ General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☒ Future Skills ☐ OEM

NCrF/NSQF Level: 6

Submitted By:

< Capital Goods and Strategic Skill Council >

<39, 1st Floor, Samyak Tower, Pusa Road, New Delhi-110005>

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Section 1: Basic Details

1.	Qualification Name	Robotics & Automation Engineer																	
2.	Sector/s	Capital Goods and Manufacturing																	
3.	Type of Qualification: ☒ New ☐ Revised ☐ Has Electives/Options ☐ OEM	NQR Code & version of existing/previous qualification: (change to previous, once approved)		Qualification Name of existing/previous version:															
4.	a. OEM Name b. Qualification Name (Wherever applicable)																		
5.	National Qualification Register (NQR) Code &Version (Will be issued after NSQC approval)	QG-06-IT-04197-2025-V1-CGSC v1.0	6. NCrF/NSQF Level: 6																
7.	Award (Certificate/Diploma/Advance Diploma/ Any Other (Wherever applicable specify multiple entry/exits also & provide details in annexure)	Certificate																	
8.	Brief Description of the Qualification	Robotics & Automation Lead Engineer-Tester is responsible for involves overseeing the design, development, testing, and implementation of robotic systems and automation solutions.																	
9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: b. <table border="1"> <thead> <tr> <th>S. No.</th> <th>Academic/Skill Qualification (with Specialization - if applicable)</th> <th>Required Experience (with Specialization - if applicable)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4 Year UG</td> <td>Not required</td> </tr> <tr> <td>2</td> <td>UG Diploma</td> <td>3 year of relevant experience</td> </tr> <tr> <td>3</td> <td>Certificate NSQF Level 5.5</td> <td>1.5 year</td> </tr> <tr> <td>4</td> <td>Certificate NSQF Level 5</td> <td>3 year of relevant experience</td> </tr> </tbody> </table> c. Age: N/A			S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1	4 Year UG	Not required	2	UG Diploma	3 year of relevant experience	3	Certificate NSQF Level 5.5	1.5 year	4	Certificate NSQF Level 5	3 year of relevant experience
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)																	
1	4 Year UG	Not required																	
2	UG Diploma	3 year of relevant experience																	
3	Certificate NSQF Level 5.5	1.5 year																	
4	Certificate NSQF Level 5	3 year of relevant experience																	

10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	22	11. Common Cost Norm Category (I/II/III) (wherever applicable): I																					
12.	Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)																							
13.	Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)	☒ Offline ☐ Online ☐ Blended <table border="1"> <thead> <tr> <th>Training Delivery Modes</th> <th>Theory (Hours)</th> <th>Practical (Hours)</th> <th>OJT Mandatory (Hours)</th> <th>Viva (Hours)</th> <th>Total (Hours)</th> </tr> </thead> <tbody> <tr> <td>Classroom (offline)</td> <td>164</td> <td>346</td> <td>150</td> <td>-</td> <td>660</td> </tr> <tr> <td>Online</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> (Refer Blended Learning Annexure for details)					Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	Viva (Hours)	Total (Hours)	Classroom (offline)	164	346	150	-	660	Online					
Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	Viva (Hours)	Total (Hours)																			
Classroom (offline)	164	346	150	-	660																			
Online																								
14.	Aligned to NCO/ISCO Code/s (if no code is available mention the same)	7412.0101																						
15.	Progression path after attaining the qualification (Please show Professional and Academic progression)	. Robotics & Automation -Manager Level 6.5 . Robotics & Automation - Head Level 7																						
16.	Other Indian languages in which the Qualification & Model Curriculum are being submitted	NO																						
17.	Is similar Qualification(s) available on NQR-if yes, justification for this qualification	☐ Yes ☒ No URLs of similar Qualifications:																						
18.	Is the Job Role Amenable to Persons with Disability	☐ Yes ☒ No If "Yes", specify applicable type of Disability:																						
19.	How Participation of Women will be Encouraged	Yes via College and Industry engagement																						
20.	Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)	☐ Yes ☒ No To be incorporated later																						
21.	Is Qualification Suitable to be Offered in Schools/Colleges	Schools ☐ Yes ☐ No Colleges ☒ Yes ☐ No																						
22.	Name and Contact Details of Submitting / Awarding Body SPOC (In case of CS or MS, provide details of both Lead AB & Supporting ABs)	Name: Ridhima Email : technicaladvisors@cgssc.org Website: www.cgssc.org Contact No.: +91-8882907092																						
23.	Final Approval Date by NSQC: 8 th April 2025	24. Validity Duration: 3 Years		25. Next Review Date: 8th May 2028																				

Section 2: Module Summary

NOS/s of Qualifications

(In exceptional cases these could be described as components)

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

Th.-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended **Proj.**-Project **Vi**-Viva

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/N SQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.	Selection and installation of Robotics & Automation Systems	CSC/N0914: Version No. – 1.0	Core	6	3	35	55	-	-	90	40	40	-	20	100	25
2.	Integration of Robots and Automation Systems using Industrial Networking Protocols.	CSC/N0915: Version No. – 1.0	Core	6	6	36	84	60		180	40	40	-	20	100	25
3.	Testing & Maintenance of Robotics & Automation System	CSC/N0916: Version No. – 1.0	Core	6	7	35	85	90		210	40	40	-	20	100	25
4.	Employability Skills (60 hours)	DGT/VSQ/N0102-NOS Version No. – 1.0	Non-Core	6	2	24	36	-	-	60	40	40	-	20	100	5
5.	Collaboratively coordinate with the team.	CSC/N19, v1.0	Non-Core	6	3	24	66	-		90	40	40	-	20	100	10

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/Non-Core	NCrF/N SQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
6.	Maintain Health, Safety and Environment at workplace.	CSC/N0505, v1.0	Non-Core	6	1	10	20			30	40	40	-	20	100	10
Duration (in Hours) / Total Marks			Duration (in Hours) / Total Marks		22	164	346	150		660	240	240	-	120	600	100

Elective NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/Non-Core	NCrF/N SQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NAN	NA
2.																
Duration (in Hours) / Total Marks																

Optional NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/Non-Core	NCrF/N SQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NAN	NA
2.																
Duration (in Hours) / Total Marks																

Assessment - Minimum Qualifying Percentage

Please specify **any one** of the following:

Minimum Pass Percentage – Aggregate at qualification level: 70 % (Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)

Minimum Pass Percentage – NOS/Module-wise: 70 % (Every Trainee should score specified minimum passing percentage in each mandatory and selected elective NOS/Module to successfully clear the assessment.)

Section 3: Training Related

1.	Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	B.E/B.Tech in Mechanical/ Electrical/Electronics/Automobile/Instrumentation with 4 years of relevant industry experience specialization in Robotics & Automation Engineer and 1 year of training experience specialization in Robotics & Automation Engineer. OR M.E/M.Tech in Mechanical/ Electrical/Electronics/Automobile/Instrumentation with 3 years of relevant industry experience specialization in Robotics & Automation Engineer and 1 year of training experience specialization in Robotics & Automation Engineer.
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	B. Tech in Mechanical/ Electrical/Electronics/Mechatronics with 7 years of relevant experience. OR M. Tech in Mechanical/ Electrical/Electronics/Mechatronics with 4 years of relevant experience.
3.	Tools and Equipment Required for Training	☒ Yes ☐ No (If "Yes", details to be provided in Annexure)
4.	In Case of Revised Qualification, Details of Any Upskilling Required for Trainer	

Section 4: Assessment Related

1	Assessor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	B.E/B.Tech in Mechanical/ Electrical/Electronics/Automobile/Instrumentation with 4 years of relevant industry experience specialization in Robotics & Automation Engineer and 1 year of training experience specialization in Robotics & Automation Engineer. OR
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		M.E/M.Tech in Mechanical/ Electrical/Electronics/Automobile/Instrumentation with 3 years of relevant industry experience specialization in Robotics & Automation Engineer and 1 year of training experience specialization in Robotics & Automation Engineer.
2	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	B.E/B.Tech in Mechanical/ Electrical/Electronics/Automobile/Instrumentation with 4 years of relevant industry experience specialization in Robotics & Automation Engineer and 1 year of training experience specialization in Robotics & Automation Engineer. OR M.E/M.Tech in Mechanical/ Electrical/Electronics/Automobile/Instrumentation with 3 years of relevant industry experience specialization in Robotics & Automation Engineer and 1 year of training experience specialization in Robotics & Automation Engineer.
3	Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	B. Tech in Mechanical/ Electrical/Electronics/Mechatronics with 7 years of relevant experience. OR M. Tech in Mechanical/ Electrical/Electronics/Mechatronics with 4 years of relevant experience.
4	Assessment Mode (Specify the assessment mode)	Formative, Summative & Skill Assessment
5	Tools and Equipment Required for Assessment	☒ Same as for training ☐ Yes ☐ No (details to be provided in Annexure-if it is different for Assessment)

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	Latest Skill Gap Study (not older than 2 years) (Yes/No): No
2.	Latest Market Research Reports or any other source (not older than 2 years) (Yes/No): No (Industry driven)
3.	Government /Industry initiatives/ requirement (Yes/No): Yes
4.	Number of Industry validation provided: 5
5.	Estimated nos. of persons to be trained and employed: 96
6.	Evidence of Concurrence/Consultation with Line Ministry/State Departments: Yes If "No", why:

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	Annexure: NCrF/NSQF level justification based on NCrF level/NSQF descriptors (Mandatory)	Q File
2.	Annexure: List of tools and equipment relevant for qualification (Mandatory, except in case of online course)	Q File
3.	Annexure: Detailed Assessment Criteria (Mandatory)	Q File
4.	Annexure: Assessment Strategy (Mandatory)	Q File
5.	Annexure: Blended Learning (Mandatory, in case selected Mode of delivery is "Blended Learning")	Yes Provided
6.	Annexure: Multiple Entry-Exit Details (Mandatory, in case qualification has multiple Entry-Exit)	Yes Provided
7.	Annexure: Acronym and Glossary (Optional)	Yes Provided
8.	Supporting Document: Model Curriculum (Mandatory – Public view)	Yes Provided
9.	Supporting Document: Career Progression (Mandatory - Public view)	Yes Provided
10.	Supporting Document: Occupational Map (Mandatory)	Yes Provided
11.	Supporting Document: Assessment SOP (Mandatory)	Yes Provided
12.	Any other document you wish to submit:	NA

Annexure: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	Understanding of Robotics and Automation Principles: A deep understanding of robotics and automation principles is essential. This includes knowledge of kinematics, dynamics, control theory, sensors, actuators, and programming languages commonly used in robotics such as C++, Python, and ROS. Mechanical Engineering Fundamentals: Understanding mechanical engineering principles is crucial for designing, analyzing, and	The role of a Robotics & Automation Lead Engineer - Tester at NSQF Level 6 encompasses a high level of theoretical knowledge and practical application, focusing on advanced engineering processes. The professional is expected to lead testing initiatives, drive	6

	optimizing robotic systems. This includes knowledge of materials, mechanisms, dynamics, and mechanical design principles. Electrical and Electronic Systems Knowledge: Familiarity with electrical and electronic systems is necessary for interfacing sensors, actuators, and controllers with robotic systems. Knowledge of circuits, electronics, power systems, and signal processing is beneficial. Programming and Software Development Skills: Proficiency in programming languages and software development is vital for developing control algorithms, simulation models, and user interfaces for robotic systems. This may involve skills in languages such as C++, Python, MATLAB, or specialized robotics programming languages.	improvements in robotic systems, and ensure that industry standards are met. Their work significantly impacts the development and operational effectiveness of automated solutions in various applications, from manufacturing to service-oriented robotics. Hence NSQF level for this descriptor is 6.	
Professional and Technical Skills/ Expertise/ Professional Knowledge	Technical Proficiency: A Robotics & Automation Lead Engineer should possess a deep understanding of robotics and automation technologies, including robot kinematics, dynamics, control systems, sensors, actuators, and programming languages. They should be proficient in using software tools for robot simulation, programming, and control. Project Management Skills: Leading engineering projects in robotics and automation requires strong project management skills. This includes the ability to plan, organize, and execute projects effectively, manage resources, set timelines, and ensure that projects are completed within budget and scope. Team Leadership: As a Lead Engineer, the ability to lead and motivate a team of engineers and technicians is essential. This involves providing guidance, mentoring, and technical support to team members, delegating tasks effectively, and fostering a collaborative work environment. Problem-Solving Abilities: Robotics & Automation Lead Engineers should be adept at identifying and solving complex technical problems that arise during the design, development, and implementation of robotic systems. They should have strong analytical skills and the ability to troubleshoot issues systematically.	The Robotics & Automation Lead Engineer - Tester aligns with NSQF Level 6 descriptors by demonstrating a comprehensive blend of professional and technical skills, deep domain expertise, and extensive professional knowledge. They should be capable of not only executing complex testing processes but also leading teams, managing projects, and driving innovation within the field. This alignment ensures that the workforce is equipped with the necessary competencies to meet industry standards and contribute effectively to technological advancements in robotics and automation.	6
Employment Readiness & Entrepreneurship	Technical Proficiency:	The role of Robotics & Automation Lead Engineer - Tester at NSQF	6

Skills & Mind-set/Professional Skill	Robotics Engineering: In-depth knowledge of robotics principles, including kinematics, dynamics, control systems, and sensor integration. Automation Systems: Understanding of automation technologies such as PLCs, HMIs, SCADA systems, and industrial networking protocols. Programming Skills: Proficiency in programming languages commonly used in robotics and automation, such as Python, C++, MATLAB, or specific robot programming languages like ROS. Mechanical Design: Ability to design and analyze mechanical components and systems, including robot arms, end-effectors, and automated machinery. Leadership and Management Skills: Project Management: Capability to lead robotics projects from conception to implementation, including planning, scheduling, resource allocation, and risk management. Team Leadership: Ability to mentor and lead interdisciplinary teams of engineers, technicians, and programmers to achieve project goals. Decision-Making: Capacity to make informed decisions under pressure, considering technical constraints, project timelines, and stakeholder requirements. Communication Skills: Strong communication skills to convey complex technical concepts effectively to team members, clients, and stakeholders. Entrepreneurial Mindset: Innovation: A proactive approach to identifying opportunities for innovation and improvement in robotics and automation solutions. Problem-Solving Orientation: A mindset geared towards finding creative solutions to technical challenges and overcoming obstacles encountered during projects. Market Awareness: Understanding of market trends, customer needs, and competitive landscape to drive business growth and stay ahead in the field.	Level 6 combines advanced technical skills with leadership capabilities to prepare professionals for significant responsibilities in the field. Mastery of the skills and mindset outlined above will ensure not only readiness for employment but also an entrepreneurial approach to innovation and process improvement within the industry. These competencies align closely with growth in careers related to cutting-edge advancements in robotics and automation.	
Broad Learning Outcomes/Core Skill	Advanced Robotics Knowledge: A deep understanding of robotics principles, including robot kinematics, dynamics, control theory, and sensor integration.	The job outcomes for a Robotics & Automation Lead Engineer - Tester align closely with the NSQF Level 6 descriptors, emphasizing a combination of advanced	6

	Automation Systems Expertise: Proficiency in designing, implementing, and optimizing automation systems, including PLCs, SCADA systems, industrial networks, and motion control systems. Programming Skills: Proficiency in programming languages commonly used in robotics and automation, such as Python, C/C++, MATLAB, or specific robotics programming languages like ROS (Robot Operating System). Project Management: Ability to lead and manage robotics and automation projects from conception to completion, including defining project scope, managing resources, scheduling tasks, and ensuring project deliverables are met on time and within budget.	knowledge, technical expertise, leadership ability, and effective communication skills. These competencies are critical for success in sophisticated automation environments.	
Responsibility	Technical Proficiency: Demonstrate a deep understanding of robotics and automation technologies, including robot kinematics, dynamics, control systems, sensors, actuators, and programming languages. System Design and Integration: Lead the design, development, and integration of robotic and automation systems into existing workflows or new projects, ensuring seamless operation and compatibility with other systems. Project Leadership: Take ownership of robotics and automation projects from conception to completion, including project planning, resource allocation, timeline management, and risk assessment. Team Management: Supervise and mentor a team of engineers and technicians, providing guidance, support, and technical expertise to ensure the successful execution of projects and tasks.	At this level, professionals are expected to demonstrate a high degree of responsibility for their work, including decision-making, creative problem-solving, and leadership. Emphasizing these competencies ensures that the engineer not only possesses the technical skills necessary for the role but also the managerial and strategic abilities to lead projects successfully and uphold industry standards.	6

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 20-25 Nos

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	Chairs/Tables	As Standard	25
2	Computer with internet	As Standard	25
3	LCD projector with screen	As Standard	1
4	Trainer chair and Table	As Standard	1
5	Demonstration table pin up boards	As Standard	1
6	White board with marker	As Standard	1
7	PLC with I/O Modules	Siemens, Mitsubishi, Allen Bradley	05
8	Robot with Teach Pendant	Fanuc, Yeskawa, Mitsubishi	02
9	Industrial Sensors	Proximity, Pressure, Temperature	10
10	Pneumatic Workbench with Components	Cylinders, Valves, Compressor	02
11	Communication Modules	CC-Link, Ethernet	05
12	Fire Extinguisher	As Standard	1
13	Safety Gloves(Rubber)	As Standard	25
14	Ear Plugs	As Standard	25
15	Safety Shoes & Helmet	As Standard	25
16	Goggles	As Standard	25
17	First-Aid Kit	As Standard	2

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. Computer / Laptop
2. Whiteboard and marker
3. Projector

Annexure: Industry Validations Summary

Provide the summary information of all the industry validations in table. This is not required for OEM qualifications.

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile (if available)
1	Broadline Computer Systems	Prabhakaran	Manager R&D	No7, 2 nd Floor Khader Nawaz Khan Road, Nungambakkam, Chennai	044 28333083	contact@broadline.co.in	
2	Jain Laboratory Instruments	Ravi Jain	Director	449, HSIIDC, Industrial Area Saha, Haryana	8569909696	sales@jlabexport.com	
3	Marathwada Autocluster	Sudarshan Dhavurkar	Center In charge	P-174, MIDC Waluj	8237272802	macluster@gmail.com	
4	Mindbridge Innovations	Aruna Anchal	General Manager	New Delhi			
5	TANSAM	Sukhpreet Singh	CEO	6 th floor, Tidel Park, Chennai	4469255700	info@tansam.org	

Annexure: Training & Employment Details

Training and Employment Projections:

Year	Total Candidates		Women		People with Disability	
	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities
2025-26	96	85	59	41	6	4
2026-27	96	81	64	45	6	5
2027-28	96	84	61	50	7	5

Data to be provided year-wise for next 3 years

Training, Assessment, Certification, and Placement Data for previous versions of qualifications: NA

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Applicable for revised qualifications only, data to be provided year-wise for past 3 years.

List Schemes in which the previous version of Qualification was implemented: NA

- 1.
- 2.

Content availability for previous versions of qualifications: NA

☐ Participant Handbook ☐ Facilitator Guide ☐ Digital Content ☐ Qualification Handbook ☐ Any Other:

Languages in which Content is available:

Annexure: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

Refer NCVET “Guidelines for Blended Learning for Vocational Education, Training & Skilling” available on:

<https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education,%20Training%20&%20Skilling.pdf>

Annexure: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

CSC/N0914: Selection and installation of Robotics & Automation Systems.

Robotics & Automation Engineer

Assessment Criteria for Outcomes	TheoryMarks	Practical Marks	Project Marks	Viva Marks
<i>Select & Develop Robotics & Automation Develop Systems layout and Component drawings.</i>	10	10	-	6
PC1. identify and select the automation elements in align with electrical, mechanical and environmental parameters like power, response time, inbuilt protections, dimension, weight, package, thermal characteristics etc. as per the e-plan and required specifications.	3	2	-	2
PC2. prepare / interpret the project design by obtaining information from mechanical drawings and layout diagram.	3	4	-	2
PC3. Identify and mitigate any potential risks associated with the design, such as safety hazards, performance bottlenecks, or compatibility issues.	4	4	-	2
<i>Perform installation of Robotics & Automation system</i>	15	15	-	10

PC4.Perform assembly of the system components like D.C. valve, cylinder assembly, Sensor Mounting etc. as per the mechanical drawings and SOP.	5	5	-	3
PC5.Follow the per-commissioning to ensure proper functionality of installed Robotics & automation Systems.	5	5	-	3
PC6.Carry out the various integration activities like programming, wiring with external elements etc. as per design document and SOP.	5	5	-	4

Assessment Criteria for Outcomes	TheoryMarks	PracticalMarks	Project Marks	Viva Marks
<i>Perform post-installation activities.</i>	15	15	-	4
PC7. conduct the trials of Robotics & automation system as per the e-plan to align it with existing or new manufacturing process.	5	4	-	1
PC8.handover the system to production team & train them on it as per organizational guidelines and procedures.	4	3	-	1

PC9.prepare documents and records such as experience under development, TGW /TGR faced during process trials etc. as a reference for future development	3	4	-	1
PC10.perform dry-run of the automation system with the existing manufacturing process.	3	4		1
NOS Total	40	40	-	20

CSC/N0915: Integration of Robots and Automation Systems using Industrial Networking Protocols

Assessment Criteria for Outcomes	TheoryMarks	PracticalMarks	ProjectMarks	Viva Marks
<i>Perform installation and commissioning of robot & Automation System</i>	10	10	-	6
PC1.Perform the per-commissioning to ensure proper functionality of safety elements like operator station controls (E-stop, cycle start, reset), safety peripherals such as light curtains, gate plug connections, tooling and teach pendant controls	3	2	-	2

PC2.Turn on the power of robot & Automation System, look for any warnings / errors in it and rectify the same as per as per organizational guidelines	3	4	-	2
PC3.Set the initial settings like robot jogging, mastering, axis limits, PLC Parameters,Hard wiring in a standalone environment as per guidelines along with robot & PLC manual.	4	4	-	2
<i>Select the Suitable Industrial Networking Protocols to Establish Communication</i>	15	15	-	10
PC4.Analyse the installed Machines,automation elements, system and robots into different layers of network architecture like field devices, control devices ,network.	5	5	-	3
PC5.Design / interpret the network consists of devices, automation system and robots, connect the intelligent devices and system using suitable network topology like STAR, LINE, RING as per network design document	5	5	-	3
PC6.select and install the suitable network protocols like MODBUS,CC-LINK, Profinet, Profibus, OPC UA, MQTT etc. based on control system requirements.	5	5	-	4

Assessment Criteria for Outcomes	TheoryMarks	PracticalMarks	ProjectMarks	Viva Marks
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<i>Perform post-System integration activities.</i>	15	15	-	4
PC7. perform the backup processes like teach pendant programs, PLC & Robot parameter, mastering data using different backup devices as per organizational guidelines.	5	5	-	1
PC8.handover the system to production team & train them on it as per organizational guidelines and procedures.	3	3		1
PC9.prepare documents and records such as experience under development, TGW /TGR faced during process trials etc. as a reference for future development.	3	3	-	1
PC10. identify critical spares like encoder, encoder battery, dedicated fuse , PLC Backup Battery,Communication Cable etc. with the help of supplier, maintenance team and plan for their availability	4	4	-	1
NOS Total	40	40	-	20

CSC/N0916: Testing & Maintenance of Robotics & Automation System.

Assessment Criteria for Outcomes	TheoryMarks	PracticalMarks	ProjectMarks	Viva Marks
<i>Fetching vital data from robotics and automation system using industrial networking.</i>	10	10	-	7
PC1. Analyse the installed automation elements, system and robots into different layers of network architecture like field devices, control devices ,network.	3	3	-	2
PC2 .Fetch the machine data of robotics and automation system like communication status, healthy hardware, life diagnosis, condition monitoring as per organizational guidelines	3	3	-	2
PC3. Fetch the process and control data of robotics and automation system like cycle start/stop, production status, operator status, system monitor as per organizational guidelines	4	4	-	3
<i>Testing of Robotics & Automation System using Simulators & Dry Run.</i>	15	15	-	9
PC4. Verify that the robotics and automation systems perform their intended functions accurately and efficiently.	5	5	-	3
PC5. Evaluate the reliability of the system under different operating conditions and stress levels. Robustness testing involves subjecting the system to variations in input parameters, environmental conditions, and unexpected events to ensure stable	5	5	-	3

PC6. Test the system's ability to detect and recover from errors and faults autonomously or with minimal human intervention. This includes simulating various failure scenarios to assess the system's resilience.	5	5	-	3
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Assessment Criteria for Outcomes	TheoryMarks	PracticalMarks	ProjectMarks	Viva Marks
☐ Carry out maintenance and troubleshooting of communication network between robotics and automation system.	15	15	-	4
PC7. prepare maintenance and troubleshooting schedule and checklist for conducting the preventive, predictive and breakdown maintenance of the industrial networking	5	5	-	2
PC8. Identify the critical spares with the help of supplier, maintenance team and plan for their availability	5	5	-	1
PC9. develop the maintenance manual with the help of supplier and maintenance team.	5	5	-	1
NOS Total	40	40	-	20

DGT/VSQ/N0102: Employability Skills (60 Hours)

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values – Citizenship</i>	1	1	-	-
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-

PC6. practice the 21st Century Skills such as Self- Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	2	2	-	-

PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	2	-	-
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	2	3	-	-
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	3	4	-	-
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-

PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-
Entrepreneurship	2	3	-	-
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	1	2	-	-
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-

Getting ready for apprenticeship & Jobs	2	3	-	-
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	20	30	-	-

CSC/N1339 – Collaboratively coordinate with the team

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Communicate effectively at the workplace</i>	7	20	-	-

PC1. exchange information and instruction with colleagues, and seek clarifications and feedback	-	-	-	-
PC2. assist colleagues where required	-	-	-	-
PC3. follow business communication etiquette in all interactions and communicative formats (online, digital, and in-person)	-	-	-	-
PC4. document and share all relevant information with stakeholders in agreed formats and as per agreed timelines	-	-	-	-
<i>Work effectively</i>	7	20	-	-
PC5. identify and obtain clarity regarding organisational, team and own goals and targets	-	-	-	-
PC6. prioritise and plan work in order to achieve goals and targets	-	-	-	-
PC7. monitor own and team performance as per agreed plan	-	-	-	-
PC8. complete duties accurately, systematically and within required timeframes	-	-	-	-
PC9. express emotions appropriately at the workplace and manage own response to heightened emotions	-	-	-	-

PC10. maintain orderliness and cleanliness in the work area Maintain and enhance professional competence	-	-	-	-
PC11. identify own strengths and weaknesses in relation to goals and targets	-	-	-	-
PC12. adapt self, service, or product to meet success criteria	-	-	-	-
PC13. seek and select opportunities for continuous professional development	-	-	-	-
PC14. formulate a professional development plan to enhance capabilities	-	-	-	-
PC15. build or contribute to the organizational knowledge base of cases, clients, issues, solutions, and innovations	-	-	-	-
PC16. examine developments and trends in field of work and their potential impact on work	-	-	-	-
PC17. take feedback from peers, supervisors and clients to improve own performance and practices	-	-	-	-
<i>Work in a disciplined and ethical manner</i>	8	20	-	-
PC18. perform tasks as per workplace standards, organizational policies and legislative requirements	-	-	-	-

PC19. display appropriate professional appearance at the workplace and adhere to the organizational dress code	-	-	-	-
PC20. demonstrate responsible and disciplined behavior at the workplace such as punctuality; completing tasks as per given time and standards; demonstrating professional behavior at all times, adopting environment- friendly practices, etc.	-	-	-	-
PC21. identify the cause of conflict and options for resolution with peers or escalate grievances and problems to appropriate authority as per procedure for conflict resolution	-	-	-	-
PC22. protect the rights of the client and organization when delivering services	-	-	-	-
PC23. ensure services are delivered equally to all clients regardless of personal and cultural beliefs	-	-	-	-
PC24. operate within an agreed ethical code of practice and report unethical conduct to the appropriate authorities	-	-	-	-
PC25. follow organizational guidelines and legal requirements on disclosure and confidentiality	-	-	-	-
<i>Uphold social diversity at the workplace</i>	8	10	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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PC26. recognize and evaluate biased practices against underrepresented groups like women and persons with disabilities, in workplace systems and processes	-	-	-	-
PC27. identify and report discrimination and harassment based on gender, disability, or cultural difference at the workplace	-	-	-	-
PC28. use inclusive or neutral language and gestures in all interactions	-	-	-	-
PC29. respect the personal and professional space of others	-	-	-	-
PC30. access grievance redressal mechanisms as per legislations	-	-	-	-
NOS Total	30	70	-	-

CSC/N0505 – Follow health, safety and environment guidelines at the workplace

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Adhere to standard safety procedures of the organisation</i>	7	10	-	-

PC1. comply with general safety procedures and those for handling equipment, tools, chemicals, and hazardous material, as prescribed and followed in the organisation	-	-	-	-
PC2. remove finger rings or any other metal objects likely to interfere with the work	-	-	-	-
PC3. ensure that identification badge or any other object worn around the neck or on the clothing does not get caught in any rotating machine, or otherwise interfere with the work	-	-	-	-
PC4. use appropriate safety devices such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, helmets etc. recommended for the work being performed	-	-	-	-
PC5. inform, escalate, or raise alarm about any suspicions, unaccounted hazardous material, devices, or other objects found in the premises	-	-	-	-
PC6. inform, escalate, or raise alarm about any breach of safety or security procedure in the organisation	-	-	-	-
PC7. help achieve zero accidents goals at work	-	-	-	-
PC8. avoid damage to sensitive electronic components due to negligence of ESD procedures	-	-	-	-

PC9. participate regularly in fire drills or other safety related workshops organised by the organisation	-	-	-	-
PC10. follow strictly all access control and perimeter safety procedures in designated factory areas such as robotic work stations, automated production lines, automated material movement and other potentially risky operations	-	-	-	-
PC11. ensure that other people follow all access control and perimeter safety procedures in designated factory areas and help avoid accidents	-	-	-	-
PC12. use emergency switches or other mechanisms of stopping a machine immediately in case any emergency situation has developed or about to happen	-	-	-	-
PC13. ensure that electrical equipment are properly grounded	-	-	-	-
PC14. follow Cyber Security guidelines and be vigilant at workplace	-	-	-	-
PC15. proceed to designated safe assembly area immediately on hearing fire alarm	-	-	-	-
<i>Follow healthy practices and posture</i>	8	10	-	-
PC16. wash hands and use sanitizers as recommended to prevent spread of diseases	-	-	-	-

PC17. follow common personal hygiene practices	-	-	-	-
PC18. maintain appropriate posture, especially in long hours of sitting or standing position and in handling heavy materials	-	-	-	-
PC19. participate in company organised health sessions such as exercises, games, yoga, physiotherapy, and other activities	-	-	-	-
PC20. handle heavy and hazardous materials with care, while maintaining appropriate posture, using suitable tools, and handling equipment such as trolleys, jacks, and ladders	-	-	-	-
PC21. learn and apply first aid devices available in the workplace	-	-	-	-
PC22. learn and apply safety and handling procedures for electrical shock and electrocution	-	-	-	-
PC23. learn and apply emergency medical help services	-	-	-	-
PC24. follow workplace decorum and avoid emotional outbursts or inappropriate language	-	-	-	-
PC25. prevent any harassment at workplace	-	-	-	-
<i>Practice waste management and recycling</i>	-	-	-	-

PC26. identify recyclable, non-recyclable, and hazardous waste generated in the workplace and comply with their disposal procedures	-	-	-	-
PC27. dispose non-recyclable waste and hazardous waste following recommended processes	-	-	-	-
PC28. deposit recyclable and reusable material at identified locations	-	-	-	-
PC29. support education and compliance of waste management processes	-	-	-	-
<i>Conserve material and resources</i>	-	-	-	-
PC30. identify ways to optimize usage of material and resources such as water, electricity, energy in various tasks, activities, and processes	-	-	-	-
PC31. check for spills and leakages of material in various tasks, activities, and processes and plug them	-	-	-	-
PC32. escalate the leakage issue to appropriate authority if needed	-	-	-	-
PC33. carry out routine cleaning of tools, machines, and equipment and maintain them in good working condition to optimize efficiency and wastage	-	-	-	-

PC34. check if the equipment is functioning normally before commencing work and rectify or report any malfunctioning to the responsible agency	-	-	-	-
PC35. check for any odour, sparks, fumes, emission, unusual vibration, noise, or any other objectionable presence in the environment and take immediate corrective action followed by report to responsible agency	-	-	-	-
PC36. ensure electrical equipment are properly connected for use and are switched off when not in use	-	-	-	-
PC37. support education and compliance of resource conservation processes	-	-	-	-
NOS Total	15	20	-	-

Assessment Parameters:

Assessment Plan:

1. Components of Assessment:

- Each subject will be assessed in three components: Theory (40% weightage), Practical (40% weightage), and On-job Training (OJT, 20% weightage).

2. Passing Parameters:

- To pass the semester, students must meet both the assessment parameters given below.

Parameter 1 - Weighted Semester Score:

Robotics & Automation Engineer

- Students must achieve a minimum of 60% in the weighted average score across all three components (Theory, Practical, and OJT) for each subject.

Parameter 2 - Individual Component Score:

- Students need to score at least 40% in each individual component (Theory, Practical, and OJT) of every subject.

Annexure: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Mention the detailed assessment strategy in the provided template.

<1. Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SIP or email
- Assessment agencies send the assessment confirmation to VTP/TC looping SSC
- Assessment agency deploys the ToA certified Assessor for executing the assessment
- SSC monitors the assessment process & records

2. Testing Environment:

- Check the Assessment location, date and time
- If the batch size is more than 30, then there should be 2 Assessors.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.

3. Assessment Quality Assurance levels/Framework:

- Question bank is created by the Subject Matter Experts (SME) are verified by the other SME
- Questions are mapped to the specified assessment criteria
- Assessor must be ToA certified & trainer must be ToT Certified

4. Types of evidence or evidence-gathering protocol:

- Time-stamped & geotagged reporting of the assessor from assessment location
- Centre photographs with signboards and scheme specific branding

5. Method of verification or validation:

- Surprise visit to the assessment location

6. Method for assessment documentation, archiving, and access

- Hard copies of the documents are stored

On the Job:

1. Each module (which covers the job profile of Robotics and Automation Engineer) will be assessed separately.
2. The candidate must score 60% in each module to successfully complete the OJT.
3. Tools of Assessment that will be used for assessing whether the candidate is having desired skills and etiquette of dealing with customers, understanding needs & requirements, assessing the customer and perform Soft Skills effectively:
 - Videos of Trainees during OJT
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4. Assessment of each Module will ensure that the candidate is able to:
 - Effective engagement with the customers
 - Understand the working of various tools and equipment
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Annexure: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.

Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf
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