

QUALIFICATION FILE

< Welding 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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Table of Contents

Section 1: Basic Details.....	3
Section 2: Module Summary	5
NOS/s of Qualifications	5
Mandatory NOS/s:	5
Elective NOS/s:	6
Optional NOS/s:.....	6
Assessment - Minimum Qualifying Percentage	6
Section 3: Training Related	6
Section 4: Assessment Related.....	7
Section 5: Evidence of the need for the Qualification	7
Section 6: Annexure & Supporting Documents Check List.....	8
Annexure: Evidence of Level	8
Annexure: Tools and Equipment (Lab Set-Up).....	11
Annexure: Industry Validations Summary.....	13
Annexure: Training & Employment Details	13
Annexure: Blended Learning	15
Annexure: Detailed Assessment Criteria	15
Annexure: Assessment Strategy	23
Annexure: Acronym and Glossary.....	24

Section 1: Basic Details

1.	Qualification Name	Welding 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: <i>(change to previous, once approved)</i>	Qualification Name of existing/previous version:																		
4.	a. OEM Name b. Qualification Name <i>(Wherever applicable)</i>																				
5.	National Qualification Register (NQR) Code &Version <i>(Will be issued after NSQC approval)</i>	QG-06-IT-04196-2025-V1-CGSC	6. NCrF/NSQF Level: 6																		
7.	Award (Certificate/Diploma/Advance Diploma/ Any Other <i>(Wherever applicable specify multiple entry/exits also & provide details in annexure)</i>	Certificate																			
8.	Brief Description of the Qualification	A Welding Automation Engineer is a specialist who focuses on designing, implementing, and improving systems that automate welding processes.																			
9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: <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>04 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</td> <td>3 years of relevant experience</td> </tr> <tr> <td>4</td> <td>Certificate NSQF Level – 5.5</td> <td>1.5 Years of relevant experience</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> b. Age: N/A		S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1	04 Year UG	Not required	2	UG Diploma	3 Year of relevant experience	3	Certificate NSQF Level – 5	3 years of relevant experience	4	Certificate NSQF Level – 5.5	1.5 Years of relevant experience			
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)																			
1	04 Year UG	Not required																			
2	UG Diploma	3 Year of relevant experience																			
3	Certificate NSQF Level – 5	3 years of relevant experience																			
4	Certificate NSQF Level – 5.5	1.5 Years of relevant experience																			
10.	Credits Assigned to this Qualification, Subject to Assessment <i>(as per National Credit Framework (NCrF))</i>	22	11. Common Cost Norm Category (I/II/III) <i>(wherever applicable):</i> I																		

12.	Any Licensing requirements for Undertaking Training on This Qualification <i>(wherever applicable)</i>	NA																						
13.	Training Duration by Modes of Training Delivery <i>(Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</i>	☒ 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>176</td> <td>334</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> <i>(Refer Blended Learning Annexure for details)</i>					Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	Viva (Hours)	Total (Hours)	Classroom (offline)	176	334	150	-	660	Online					
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Classroom (offline)	176	334	150	-	660																			
Online																								
14.	Aligned to NCO/ISCO Code(s) <i>(if no code is available mention the same)</i>	7412.0101																						
15.	Progression path after attaining the qualification <i>(Please show Professional and Academic progression)</i>	- Welding Automation Manager - 6.5 - Welding Automation Specialist - 7																						
16.	Other Indian languages in which the Qualification & Model Curriculum are being submitted	NA																						
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 <i>(Specify the NOS/Module which covers it)</i>	☐ 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 <i>(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</i>	Name: Hitesh Email : standards@cgssc.org Contact No.: +91-78382 93838 Website: www.cgssc.org																						
23.	Final Approval Date by NSQC:	24. Validity Duration: 3 Years			25. Next Review Date																			

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/NSQF 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.	Bridge Module & Perform welding tasks according to specifications and project requirements.	CSC/N0917 : Version No. – 1.0	Core	6	3	30	60	-	-	90	40	40	-	20	100	15
2.	Set up and program Automated welding systems.	CSC/N0918 Version No. – 1.0	Core	6	5	34	56	60	-	150	40	40	-	20	100	20
3.	Diagnose, troubleshoot, and conduct routine maintenance tasks on welding automation equipment	CSC/N0919 Version No. – 1.0	Core	6	7	36	84	90	-	210	40	40	-	20	100	35
4.	Collaboratively coordinate with the team.	CSC/N1339, v1.0	Non-Core	6	3	30	60	-	-	90	40	40	-	20	100	10
5.	Maintain Health, Safety and Environment at workplace.	CSC/N0505, v1.0	Non-Core	6	1	10	20	-	-	30	40	40	-	20	100	10
6.	Employability Skills (90 hours)	DGT/VSQ/N0103 Version No. – 1.0	Non-Core	6	3	36	54	-	-	90	40	40	-	20	100	10
Duration (in Hours) / Total Marks					22	176	334	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/NSQF 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.																
2.																
Duration (in Hours) / Total Marks																

Optional NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/Non-Core	NCrF/NSQF 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.																
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 (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 4 years relevant industry experience and 1 year training experience. Or M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 3 years relevant industry experience and 1 year training experience.
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	B.E./B.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 6 years relevant industry experience and 1 year training experience. Or

		M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 4 years relevant industry experience and 1 year training 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	NA

Section 4: Assessment Related

	Assessor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	B.E./B.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 4 years relevant industry experience and 1 year training experience. Or M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 3 years relevant industry experience and 1 year training experience.
	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	B.E./B.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 4 years relevant industry experience and 1 year training experience. Or M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 3 years relevant industry experience and 1 year training experience.
	Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	B.E./B.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 6 years relevant industry experience and 1 year training experience. Or M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 4 years relevant industry experience and 1 year training experience.
	Assessment Mode (Specify the assessment mode)	Formative, Summative & Skill Assessment
	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
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:
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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 (<i>Mandatory</i>)	Q File
2.	Annexure: List of tools and equipment relevant for qualification (<i>Mandatory, except in case of online course</i>)	Q File
3.	Annexure: Detailed Assessment Criteria (<i>Mandatory</i>)	Q File
4.	Annexure: Assessment Strategy (<i>Mandatory</i>)	Q File
5.	Annexure: Blended Learning (<i>Mandatory, in case selected Mode of delivery is “Blended Learning”</i>)	Yes Provided
6.	Annexure: Multiple Entry-Exit Details (<i>Mandatory, in case qualification has multiple Entry-Exit</i>)	Yes Provided
7.	Annexure: Acronym and Glossary (<i>Optional</i>)	Yes Provided
8.	Supporting Document: Model Curriculum (<i>Mandatory – Public view</i>)	Yes Provided
9.	Supporting Document: Career Progression (<i>Mandatory - Public view</i>)	Yes Provided
10.	Supporting Document: Occupational Map (<i>Mandatory</i>)	Yes Provided
11.	Supporting Document: Assessment SOP (<i>Mandatory</i>)	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	Welding Principles: Understanding of welding processes, including Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Gas Tungsten Arc Welding (GTAW), and Flux Cored Arc Welding (FCAW). Familiarity with welding terminology, symbols, and codes (e.g., AWS, ASME). Electronics and Controls:	Engineers operating at this level are expected to handle complex projects and demonstrate advanced competencies in technical areas of automation and welding. They should contribute to innovative practices in welding automation, thereby	6

	Knowledge of electrical circuits, wiring diagrams, and control systems. Understanding of microcontrollers, programmable logic controllers (PLCs), and human-machine interfaces (HMIs). Mechanical Systems: Familiarity with mechanical systems, including gears, belts, and pulleys. Understanding of mechanical principles, such as torque, force, and motion. Robotics and Automation: Knowledge of robotics and automation principles, including motion control, sensing, and feedback. Understanding of robotic arms, grippers, and end-effectors.	driving improvements and advancements in the field. Outcomes also include the ability to collaborate effectively with other professionals (engineers, technicians, managers) to achieve common goals. Hence NSQF level for this descriptor is 6.	
Professional and Technical Skills/ Expertise/ Professional Knowledge	Welding Principles: Understand the fundamentals of welding, including welding processes, weld joint types, and welding defects. Automation Systems: Familiarity with welding automation systems, including robotics, CNC machines, and programmable logic controllers (PLCs). Programming: Knowledge of programming languages, such as C++, Python, or LabVIEW, for programming welding automation systems. Mechanical Systems: Understanding of mechanical systems, including mechanical design, fabrication, and assembly. Electrical Systems: Familiarity with electrical systems, including electrical circuit design, troubleshooting, and repair. Sensors and Controls: Knowledge of sensors and controls used in welding automation systems, including temperature sensors, pressure sensors, and proximity sensors. Safety and Quality: Awareness of safety protocols and quality control procedures in welding automation applications. Troubleshooting: Ability to troubleshoot and diagnose issues with welding automation systems.	A Welding Automation Engineer at NSQF Level 6 should embody a robust combination of advanced technical skills, deep industry expertise, and a strong foundation of professional knowledge. This level emphasizes the ability to tackle complex challenges in welding automation while leading innovative projects that enhance productivity and maintain high safety and quality standards.	6
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Technical Skills: Strong understanding of welding processes, automation systems, and robotics. Ability to operate and troubleshoot welding automation systems. Familiarity with programming languages such as CNC, PLC, and robot programming.	Level 6 in the NCrF/NSQF framework provides a guideline for the competencies and attributes a Welding Automation Engineer should possess. This encompasses both employment readiness and entrepreneurial skills, emphasizing the need for technical	6

	Analytical Skills: Ability to analyze welding processes and identify areas for improvement. Knowledge of troubleshooting techniques and problem-solving methods. Communication Skills: Effective communication with clients, colleagues, and management to understand requirements, discuss solutions, and provide updates. Collaboration Skills: Ability to work collaboratively with cross-functional teams, including engineers, technicians, and operators.	expertise, innovative thinking, business acumen, and professional skills, all of which are vital for career success and self-employment opportunities in today's manufacturing landscape.	
Broad Learning Outcomes/Core Skill	Welding Automation Systems: Design, installation, testing, and maintenance of welding automation systems. Troubleshooting and repairing of welding automation systems. Programming and Controls: Programming and control of welding automation systems using programming languages such as PLC, CNC, and others. Understanding of control systems, including sensors, actuators, and feedback mechanisms. Robotics and Motion Control: Understanding of robotics and motion control systems, including robotic arms, grippers, and end-effectors. Ability to program and troubleshoot robotic systems. Welding Processes and Techniques: Understanding of various welding processes (e.g., MIG, TIG, Arc), including welding parameters, shielding gases, and filler materials. Ability to troubleshoot and adjust welding processes to achieve optimal results.	The role of a Welding Automation Engineer at NSQF Level 6 is characterized by a robust application of technical skills, advanced knowledge of engineering principles, a strong focus on safety and sustainability, and the ability to work collaboratively within diverse teams.	6
Responsibility	Design and installation: Design welding automation systems for various industries, including manufacturing, construction, and energy. Install and configure welding automation systems, including robots, welding machines, and control systems. Ensure that all systems meet safety and quality standards. Troubleshooting and maintenance: Troubleshoot issues with welding automation systems, identifying root causes and implementing corrective actions.	The role of a Welding Automation Engineer at NSQF Level 6 reflects substantial responsibility across several dimensions, including project leadership, quality assurance, team supervision, and client interaction. These align precisely with the NSQF Level 6 expectations of skills, responsibility, and outcomes in a professional context.	6

	Perform routine maintenance tasks, such as cleaning and lubricating equipment, to ensure optimal performance. Conduct predictive maintenance to prevent equipment failures and minimize downtime.		
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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 per standard	25
2	Computer with internet	As per standard	25
3	LCD projector with screen	As per standard	1
4	Trainer chair and Table	As per standard	1
5	Demonstration table pin up boards	As per standard	1
6	White board with marker	As per standard	1
7	Hand Tools	Multimeters (voltage, current, resistance, frequency) Wire testers (continuity, insulation) Pliers (needle-nose, slip-joint) Screwdrivers (flathead, Phillips) Torx drivers Wrenches (adjustable, fixed) Socket sets Ratchets and sockets Pumps and pressure gauges Safety glasses and gloves	1 each
8	Power Tools	Drills (cordless, corded) Impact wrenches Reciprocating saws (Saws-All) Grinders (angle grinders, die grinders) Sanding machines (belt sanders, orbital sanders) Cutting machines (plasma cutters, laser cutters)	1 each
9	Welding Equipment	Welding machines (MIG, TIG, ARC) Welding guns and torches	1 each

		Welding electrodes and wire Welding shielding gas cylinders Welding fume extractors	
10	Specialized Tools	Welding automation system testing tools (e.g., welding process analyzers) Robot programming and simulation tools (e.g., robot simulation software) Laser welding system testing tools (e.g., laser welding process analyzers)	1 each
11	Test and Measurement Equipment	Oscilloscopes Logic analyzers Multimeters with advanced functions (e.g., frequency counters)	
12	Fire Extinguisher	As per standard	1
13	Safety Gloves(Rubber)	As per standard	25
14	Ear Plugs	As per standard	25
15	Safety Shoes & Helmet	As per standard	25
16	Goggles	As per standard	25
17	First-Aid Kit	As per 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	80	80	56	5	3
2026-27	96	86	80	67	8	5
2027-28	96	83	43	20	10	7

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

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:

NSQC Approved

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/N: Perform welding tasks according to specifications and project requirements

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Interpretation of welding specifications, project requirements, and engineering drawings to determine welding processes</i>	10	10	-	6
PC1. Comprehend welding specifications provided in documents such as welding procedure specifications (WPS), welding symbols, and weldment drawings, identifying key parameters like weld size, type, and joint configuration	3	2	-	2

PC2. Evaluate project requirements and constraints, including material types, thicknesses, and environmental factors, to determine the most suitable welding processes, techniques, and equipment needed to meet project objectives.	3	4	-	2
PC3. Interpret engineering drawings and blueprints, extracting essential information such as welding symbols, dimensions, tolerances, and welding symbols, to visualize the welding requirements and plan the execution of welding tasks accordingly.	4	4	-	2
<i>Execution of Welding Tasks with precision and accuracy</i>	15	15	-	10
PC4. Utilize appropriate welding techniques and methods, including arc length control, travel speed, and electrode manipulation, to achieve consistent and uniform weld bead formation while ensuring proper fusion and penetration.	5	5	-	3
PC5. Monitor and adjust welding parameters such as voltage, current, wire feed speed, and shielding gas flow rate to maintain optimal conditions for the welding process, minimizing defects and ensuring weld quality.	5	5	-	3
PC6. Adhere to Safety Protocols and procedures, including the use of personal protective equipment (PPE), proper ventilation, and safe handling of welding equipment, to ensure a safe working environment for oneself and others.	5	5	-	4

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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<i>Monitor welding processes and inspect completed welds to verify compliance with specs and project requirements</i>	15	15	-	4
PC7. Monitor welding parameters and conditions throughout the welding process, including voltage, current, travel speed, and shielding gas flow, to ensure consistency and adherence to specified parameters.	5	4	-	1
PC8. Inspect completed welds visually for defects such as cracks, porosity, incomplete fusion, or inadequate penetration, comparing the results against specified acceptance criteria outlined in welding procedures and project requirements.	4	3	-	1
PC9. Utilize non-destructive testing techniques such as ultrasonic testing (UT), magnetic particle testing (MT), or dye penetrant testing (PT) to detect internal defects or discontinuities in welds that may not be visible to the naked eye.	3	4	-	1
PC10. Maintain documentation of inspection results, including any deviations from specifications or project requirements, along with corrective actions taken, providing clear and comprehensive reports for quality control purposes and traceability.	3	4		1
NOS Total	40	40	-	20

CSC/N: Set up and program Automated welding systems

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform system configuration of automated welding system by setting up robotic arms</i>	10	10	-	6
PC1. Perform installation and mounting of robotic arms onto designated fixtures or mounting points within the welding cell, ensuring stability and alignment with the workpiece.	3	2	-	2
PC2. Attach the appropriate end effectors or welding torches to the robotic arms, considering factors such as tooling compatibility, reach requirements, and welding process specifications.	3	4	-	2
PC3. Conduct calibration procedures to ensure accurate positioning and movement of the robotic arms, verifying alignment with programmed motion paths and workspace boundaries.	4	4	-	2
<i>Conduct programming of welding parameters such as voltage, current, wire feed speed, travel speed</i>	15	15	-	10
PC4. Comprehensive understanding of various welding processes (e.g., MIG/MAG, TIG, stick), including their characteristics, advantages, and limitations, to determine the appropriate parameters for each process.	5	5	-	3
PC5. Proficiency in programming welding parameters such as voltage, current, wire feed speed, and travel speed into the control system of the welding equipment or robotic welder, using the appropriate programming language or software interface.	5	5	-	3

PC6. Optimize welding parameters based on material type, thickness, joint configuration, and desired weld quality, considering factors such as penetration, fusion, deposition rate, and spatter reduction.	5	5	-	4
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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Implement Motion Path Planning for the robotic arm(s) to follow during welding.</i>	15	15	-	4
PC7. Knowledge of the geometry of the weld joint, including its shape, dimensions, and orientation, to develop a motion path that ensures complete coverage and proper fusion of the weld.	5	5	-	1
PC8. Proficiency in programming robotic arm motion using specialized software or programming languages, including defining start points, end points, trajectories, and any intermediate points or waypoints required for the welding operation.	3	3		1
PC9. Ensure safety considerations, such as clearance distances from obstacles or other equipment, and optimize the motion path to minimize unnecessary movements and maximize efficiency in welding operations.	3	3	-	1
PC10. Conduct real-world testing and validation of the motion path on the actual welding setup, observing the robotic arm's movements and weld quality to verify compliance with project requirements and specifications.	4	4	-	1
NOS Total	40	40	-	20

CSC/N: Diagnose, troubleshoot and conduct routine maintenance tasks on welding automation equipment

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Identify and diagnose equipment malfunctions through systematic analysis of symptoms.</i>	10	10	-	7
PC1. Assess & analyze symptoms of equipment malfunctions, such as abnormal noises, inconsistent weld quality, error messages, or unexpected machine behavior, to pinpoint potential issues.	3	3	-	2
PC2. Utilize diagnostic tools and techniques, including multimeters, oscilloscopes, and software-based diagnostic programs, to gather data and perform tests that help identify the root causes of equipment malfunctions.	3	3	-	2
PC3. Consult technical documentation such as equipment manuals, schematics, and troubleshooting guides to understand the normal operation parameters and identify deviations that indicate specific malfunctions.	4	4	-	3
<i>Perform repair tasks such as replacing faulty components, adjusting settings to rectify identified issues</i>	12	12	-	9

PC4. Identify and replace faulty components such as sensors, actuators, wiring, or control modules using proper tools and techniques, ensuring the new components are correctly installed and compatible with the system.	4	4	-	3
PC5. Implement adjustment of system settings and parameters, such as welding voltage, current, wire feed speed, and robotic arm movement paths, to correct performance issues and ensure the equipment operates within specified tolerances and standards.	4	4	-	3
PC6. Conduct thorough testing and validation of the repairs by running the equipment through its operational cycles, monitoring for proper functionality and performance, and ensuring that the identified issues have been effectively rectified.	4	4	-	3

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Execute routine maintenance tasks including cleaning, lubrication, inspection of mechanical and electrical components, and calibration of sensors</i>	18	18	-	4
PC7. Perform regular cleaning of the welding automation equipment regularly to remove dust, debris, and welding residues that can affect the performance and longevity of the equipment.	5	5	-	1
PC8. Conduct lubrication to moving parts and mechanical components as specified in the equipment maintenance manual, ensuring smooth operation and reducing wear and tear.	5	5	-	1

PC9. Inspect mechanical components (e.g., gears, bearings, and joints) and electrical components (e.g., wiring, connectors, and control units) for signs of wear, damage, or loose connections, taking corrective actions as necessary to prevent equipment failure.	4	4	-	1
PC10. Calibrate sensors, controllers, and other measurement devices to ensure accurate readings and proper functioning, following the manufacturer's calibration procedures and using the appropriate tools and reference standards.	4	4	-	1
NOS Total	40	40	-	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:

- 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 Welding Automation) 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
 -
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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