

QUALIFICATION FILE

< Advance Mechatronics- Designer and Planner >

☒ 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	Advance Mechatronics- Designer and Planner																
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: V1															
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-04204-2025-V1-CGSC	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	Designer and Planner in Advanced Mechatronics is responsible for the conceptualization, design, planning, and execution of sophisticated mechatronic systems.																
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>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> b. 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)	N/A																

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					
		Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	Viva (Hours)	Total (Hours)
		Classroom (offline)	176	334	150	-	660
		Online					
		(Refer Blended Learning Annexure for details)					
14.	Aligned to NCO/ISCO Code(s) (<i>if no code is available mention the same</i>)	2144.9900					
15.	Progression path after attaining the qualification (<i>Please show Professional and Academic progression</i>)	- Mechatronics Engineering Manager Level – 6.5 - Technical Program Manager Level – 7					
16.	Other Indian languages in which the Qualification & Model Curriculum are being submitted	YES					
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 Industry or College 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 Website: www.cgssc.org Contact No.: 91-78382 93838					
23.	Final Approval Date by NSQC: 08/05/2025	24. Validity Duration: 3 Years			25. Next Review Date: 08/05/2028		

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/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 & Lead/Oversee the System integration of machines with PLC and SCADA system.	CSC/N0474 : Version No. – 1.0	Core	6	2	20	40	-	-	60	40	40	-	20	100	10
2.	Perform the Data Analytics motion on the retrieved data from the mechatronic systems and perform control feedback process.	CSC/N0475 : Version No. – 1.0	Core	6	4	20	40	60	-	120	40	40	-	20	100	20
3.	Design the panels using CAD tools allowing proper tolerance and dimensions for individual components.	CSC/N0476 : Version No. – 1.0	Core	6	3	20	40	30	-	90	40	40	-	20	100	15
4.	Perform process control, feedback, and automate the existing manual operations.	CSC/N0477 : Version No. – 1.0	Core	6	3	20	40	30	-	90	40	40	-	20	100	15
5.	Set up advanced automation in mechatronics	CSC/N0478 : Version No. – 1.0	Core	6	4	20	70	30	-	120	40	40	-	20	100	15
6.	Collaboratively coordinate with the team.	CSC/N1339, v1.0	Non-Core	6	3	30	60	-	-	90	40	40	-	20	100	10
7.	Maintain Health, Safety and Environment at workplace.	CSC/N0505, v1.0	Non-Core	6	1	10	20	-	-	30	40	40	-	20	100	5

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)
8.	Employability Skills (60 hours)	DGT/VSQ/ N0102: Version No. – 1.0	Non Core	6	2	36	24	-	-	60	40	40	-	20	100	10
Duration (in Hours) / Total Marks					22	176	334	150		660	320	320	-	160	800	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 7 years relevant industry experience and 1 year training experience. Or M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 5 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

1	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.
2	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.
3	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 7 years relevant industry experience and 1 year training experience. Or M.E./M.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) with 5 years relevant industry experience and 1 year training experience.
4	Assessment Mode (Specify the assessment mode)	Offline

5	Tools and Equipment Required for Assessment	☒ Same as for training ☐ Yes ☐ No <i>(details to be provided in Annexure-if it is different for Assessment)</i>
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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 <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:	N/A
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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	Mechatronics Systems Theory: Understanding the integration of mechanical, electrical, and software systems. Knowledge of sensors, actuators, and their interfaces. Familiarity with control systems and automation principles. Mechanical Engineering Fundamentals: Knowledge of mechanics, dynamics, and materials science. Proficiency in computer-aided design (CAD) and computer-aided engineering (CAE) tools. Understanding of manufacturing processes and techniques. Electrical and Electronic Engineering: Principles of electrical circuits, signal processing, and power electronics. Knowledge of microcontrollers, programmable logic controllers (PLCs), and embedded systems. Understanding of communication protocols and network systems.	An individual at this level should possess comprehensive theoretical knowledge of mechatronics, which includes an understanding of mechanical systems, electronics, and computer-integrated technologies. Detailed knowledge of design tools, software (like CAD), and modeling techniques is essential to create effective mechatronic designs. Knowledge of industry standards, safety regulations, and ethical considerations in design and planning processes is crucial for compliance.	6
Professional and Technical Skills/ Expertise/ Professional Knowledge	Systems Integration: Proficiency in integrating mechanical, electrical, and software components into cohesive and functional mechatronic systems. Design and Development: Advanced skills in designing mechatronic systems, including CAD (Computer-Aided Design), CAM (Computer-Aided Manufacturing), and simulation software. Project Management: Strong project management skills, including planning, scheduling, budgeting, and resource allocation.	For an Advanced Mechatronics Designer and Planner, the outcomes related to NSQF Level 6 may include: Leading the design of innovative mechatronic systems that meet specific customer requirements, adhering to industry standards and utilizing best practices.	6

	Programming and Control Systems: Expertise in programming languages commonly used in mechatronics (e.g., C, C++, Python, MATLAB) and experience with control systems and automation technologies (e.g., PLCs, SCADA). Problem-Solving and Analytical Skills: Ability to analyze complex problems, identify root causes, and develop innovative solutions. Technical Documentation: Competence in preparing detailed technical documentation, including specifications, design reports, and user manuals. Communication Skills: Effective communication skills for collaborating with multidisciplinary teams and presenting technical information to non-technical stakeholders.	Successfully planning and executing multiple mechatronic design projects, managing time, resources, and budget efficiently. Implementing quality control measures to ensure that mechatronic systems are designed and manufactured to high standards.	
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Technical Proficiency: Deep understanding of mechatronics systems, including mechanical, electrical, and software components. Project Management: Ability to manage complex projects, including planning, scheduling, resource allocation, and risk management. Team Collaboration: Strong teamwork and collaboration skills to work effectively with multidisciplinary teams. Communication Skills: Proficiency in both verbal and written communication to convey complex technical information clearly and effectively. Problem-Solving Skills: Advanced problem-solving abilities to address and resolve technical challenges efficiently. Adaptability and Continuous Learning: Openness to continuous learning and adaptability to new technologies and methodologies.	At Level 6, individuals are expected to have a substantial foundational knowledge of mechatronics. This includes a deep understanding of systems integration, advanced mathematics, and engineering principles, which is essential for employment in high-level design and planning roles. They should demonstrate the ability to apply theoretical knowledge in real-world situations, focusing on design and implementation within a team-oriented context. Effective communication skills are critical, ensuring that ideas and designs can be articulated clearly to non-technical stakeholders as well as team members. This prepares them for collaborative environments found in workplaces.	6
Broad Learning Outcomes/Core Skill	Advanced Technical Expertise: Deep understanding of the principles and applications of mechatronics, including mechanical, electrical, and computer engineering.	As an Advance Mechatronics-Designer and Planner, the individual is expected to demonstrate advanced skills, knowledge, and understanding in mechatronics design, development, and	6

	System Integration: Proficiency in integrating mechanical, electrical, and electronic systems to create advanced mechatronic solutions. Project Management: Ability to manage complex projects from conception through to completion, including planning, scheduling, resource allocation, and risk management. Innovation and Design: Capability to design innovative mechatronic systems and components, applying creativity and advanced engineering principles. Analytical and Problem-Solving Skills: Strong analytical skills to identify, diagnose, and solve complex engineering problems. Leadership and Team Collaboration: Effective leadership skills to guide multidisciplinary teams, with the ability to foster collaboration and drive team performance. Communication Skills: Excellent communication skills for articulating technical concepts to both technical and non-technical stakeholders, including writing reports and presenting findings.	planning. The job role/outcomes relate to the NCrF/NSQF level descriptor 6 in the following ways: The Advance Mechatronics-Designer and Planner Lead must analyze complex mechatronics systems, evaluate alternative solutions, and develop effective solutions. The individual must design, develop, and test mechatronics systems, components, and interfaces, considering factors like functionality, safety, and sustainability. The Advance Mechatronics-Designer and Planner must lead and manage cross-functional teams, allocate resources, and prioritize tasks to ensure project delivery and meet stakeholder expectations.	
Responsibility	System Design and Integration: Lead the design, development, and integration of advanced mechatronic systems. Ensure that designs meet specified performance, safety, and reliability criteria. Project Planning and Management: Develop detailed project plans, including timelines, budgets, and resource allocation. Coordinate with cross-functional teams to ensure timely and efficient project execution. Technical Leadership: Provide technical guidance and mentorship to junior engineers and team members.	In the role of a Designer and Planner in Advanced Mechatronics, the following responsibilities and skill sets relate closely to the NSQF Level 6 descriptor: Oversee the planning, execution, and delivery phases of complex mechatronic projects. Direct and manage multidisciplinary teams, ensuring project goals and deadlines are met. Lead the design process for intricate mechatronic systems and products.	6

	Stay updated with the latest technological advancements and incorporate them into projects. Safety and Compliance: Ensure all designs and implementations comply with relevant safety standards and regulations. Conduct risk assessments and implement necessary safety measures in the design and execution phases.	Evaluate and validate designs against industry standards, ensuring innovative and effective solutions.	
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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 standard	25
2	Computer with internet	High-performance computers with sufficient processing power and graphics capabilities.	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	Computer-Aided Design (CAD) Software	Tools like SolidWorks, AutoCAD, Fusion 360, or similar software for creating 3D models and designs	1
8	Simulation and Modeling Tools	Tools for simulating and analyzing the structural, thermal, and fluid dynamics aspects of designs, such as ANSYS, COMSOL, or SimScale	1
9	Electronic Design Automation (EDA) Software:	Altium Designer or Cadence Allegro	1
10	Testing and Measurement Instruments	Multimeter, Oscilloscope, Signal Generator, Logic analyser, Power Supply Unit, Communication modules	1
11	Robotics Hardware and Kits	Development boards: Arduino Mega, Microcontrollers: ESP 32 series, Motor drivers and Actuators	1

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	86	35	22	5	3
2026-27	96	85	30	21	10	5
2027-28	96	81	30	21	5	3

Data to be provided year-wise for next 3 years

Training, Assessment, Certification, and Placement Data for previous versions of qualifications: Not applicable

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: Not applicable

- 1.
- 2.

Content availability for previous versions of qualifications: Not applicable

☐ 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/N0474: Lead/Oversee the System integration of machines with PLC and SCADA system.

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Select & Develop System Design, Architecture & Configuration for PLC & SCADA System</i>	10	10	-	6
PC1. identify and analyze the operational needs from stakeholders and select appropriate PLC hardware and SCADA software based on performance criteria and compatibility.	3	2	-	2
PC2. Prepare high-level and detailed system architecture, create control logic, and configure SCADA interfaces to ensure seamless integration and effective operation of all components.	3	4	-	2

PC3. Perform comprehensive system testing to validate performance, provide training for operators and maintenance personnel, and maintain detailed documentation for compliance and continuous improvement.	4	4	-	2
<i>Perform integration & implementation of PLCs & SCADA Systems.</i>	15	15	-	10
PC4. Conduct Integration of PLCs, SCADA systems, sensors, actuators, and network devices, ensuring all components communicate effectively and function as a cohesive unit	5	5	-	3
PC5. Implement configuration of PLCs and SCADA software according to design specifications, and perform rigorous testing, including functional, performance, and reliability tests, to validate that the system meets all operational requirements.	5	5	-	3
PC6. Develop and deliver training programs for operators and maintenance personnel, and maintain comprehensive documentation to support system operation, maintenance, and compliance with industry standards.	5	5	-	4

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform post-integration activities like Testing & Validation.</i>	15	15	-	4
PC7. Perform thorough functional, performance, and reliability tests to ensure the integrated PLC and SCADA systems operate correctly and meet all specified requirements.	5	4	-	1
PC8. Carry out Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT) to confirm that the system performs as expected in both controlled and real-world environments.	4	3	-	1
PC9. prepare document testing procedures, results, and any issues encountered during testing, and effectively communicate findings to stakeholders.	3	4	-	1
PC10. Implement corrective actions as needed based on testing outcomes to ensure the reliability and effectiveness of the integrated systems.	3	4		1
NOS Total	40	40	-	20

CSC/N0475: Perform the Data Analytics motion on the retrieved data from the mechatronic systems and perform control feedback process.

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform data collection and analysis of data from mechatronic systems</i>	10	10	-	6
PC1. Implement the identification and gathering of relevant data from sensors, actuators, PLCs, and SCADA systems within the mechatronic setup, ensuring data accuracy, completeness, and preprocessing to handle noise and missing values.	3	2	-	2
PC2. Utilizing descriptive, predictive, and prescriptive analytics methods to process and analyze the data, extracting meaningful insights and identifying patterns, trends, and potential issues within the system.	3	4	-	2
PC3. Creation of clear and informative visualizations, dashboards, and reports to present the analyzed data, highlighting key insights, performance metrics, and recommendations for system optimization and decision-making.	4	4	-	2
<i>Develop and integrate control algorithms to establish feedback loops</i>	15	15	-	10
PC4. Develop control algorithms based on system requirements and data insights, ensuring they effectively manage and adjust system operations in response to real-time data.	5	5	-	3

PC5. Integrate these control algorithms into the mechatronic system, establishing robust feedback loops that allow for dynamic adjustments to operational parameters to maintain optimal performance.	5	5	-	3
PC6. Perform rigorous testing and validation of the control algorithms and feedback loops to ensure they function correctly under various conditions, making necessary adjustments to enhance reliability and effectiveness.	5	5	-	4

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform post-Control integration activities for continuous improvement.</i>	15	15	-	4
PC7. Perform continuous monitoring of the integrated control systems and feedback loops, using real-time data to track performance and identify any deviations from desired operating conditions	5	5	-	1
PC8. Conduct regular analysis of performance data to detect trends, anomalies, and areas for improvement, leveraging advanced analytics tools and techniques.	3	3		1
PC9. Applying of insights gained from performance analysis to refine and optimize control algorithms and system parameters, ensuring ongoing enhancements to system efficiency and reliability.	3	3	-	1
PC10. Prepare detailed documentation of all improvements and adjustments made, and effectively communicate these changes to relevant stakeholders to ensure transparency and alignment with operational goals, availability.	4	4	-	1
NOS Total	40	40	-	20

CSC/N0476: Design the panels using CAD tools allowing proper tolerance and dimensions for individual components.

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Identify, selection and placement of appropriate components for the panel design</i>	10	10	-	7
PC1. Analyze the functional requirements and environmental conditions of the panel system, including voltage ratings, current loads, and temperature specifications.	3	3	-	2
PC2. Conduct thorough research to identify suitable components such as circuit breakers, contactors, relays, and indicators, considering factors like performance, compatibility, and industry standards. Evaluate the components based on technical specifications, reliability, availability, and cost-effectiveness.	3	3	-	2
PC3. Integrate components into design by utilizing CAD tools to accurately place and arrange selected components within the panel enclosure, ensuring efficient use of space, proper wiring layout, and accessibility for maintenance and troubleshooting.	4	4	-	3
<i>Implementation of proper tolerances & dimension management of panel components in CAD design</i>	12	12	-	9
PC4. Analyze engineering drawings, specifications, and standards to determine the required tolerances for panel components. Grasp the implications of tolerance stack-up and how it affects the overall fit and function of the panel assembly.	4	4	-	3

PC5. Utilize CAD software tools to perform tolerance analysis, ensuring that components fit together properly and meet design specifications. Adjust component dimensions and tolerances iteratively to optimize the overall assembly and account for manufacturing variations.	4	4	-	3
PC6. Conduct virtual simulations and interference checks within the CAD environment to verify that components align correctly and function as intended. Iterate the design based on simulation results to achieve the desired level of tolerance and dimensional accuracy in the final panel assembly.	4	4	-	3

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Integration of functional features into the panel design</i>	18	18	-	4
PC7. Gather requirements from stakeholders and specifications to determine the necessary functional features such as cable entry points, ventilation systems, and mounting provisions for additional equipment.	5	5	-	1
PC8. Design the functional features seamlessly into the panel design, ensuring they meet operational needs while maintaining safety, accessibility, and compliance with relevant standards and regulations.	5	5	-	1
PC9. Integrate functional features into the panel design, allowing for precise placement and alignment of components such as cable glands, ventilation louvers, and mounting brackets.	4	4	-	1
PC10. Perform virtual simulations and 3D modeling within the CAD environment to validate the integration of functional features, ensuring they do not interfere with other components and contribute to the overall functionality and efficiency of the panel system.	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 the 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 Advance Mechatronics Designer and Planner) 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

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