QUALIFICATION FILE

Mechatronics Maintenance Specialist

☒ 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: 5

NSOC Approved

Submitted By:

Electronics Sector Skills Council of India (ESSCI)

155, 2nd Floor, ESC House

Okhla Industrial Area - Phase 3,

New Delhi – 110020

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Section 1: Basic Details

<table>
<tr><td>1.</td><td>Qualification Name</td><td colspan="2">Mechatronics Maintenance Specialist</td></tr>
<tr><td>2.</td><td>Sector/s</td><td colspan="2">Electronics</td></tr>
<tr><td>3.</td><td>Type of Qualification: ☐ New ☒ Revised ☐ Has Electives/Options
☐OEM</td><td>NQR Code & version of existing/previous qualification:
(change to previous, once approved)- QG-05-EH-00427-2023-V1.1-ESSC & V2.0</td><td>Qualification Name of existing/previous version:
Mechatronics Maintenance Specialist</td></tr>
<tr><td>4.</td><td>a. OEM Name
b. Qualification Name
(Wherever applicable)</td><td colspan="2">NA</td></tr>
<tr><td>5.</td><td>National Qualification Register (NQR) Code & Version
(Will be issued after NSQC approval)</td><td>QG-05-EH-03974-2025-V3-ESSCI</td><td>6. NCrF/NSQF Level: 5</td></tr>
<tr><td>7.</td><td>Award (Certificate/Diploma/Advance Diploma/ Any Other (Wherever applicable specify multiple entry/exits also & provide details in annexure)</td><td colspan="2">Certificate</td></tr>
<tr><td>8.</td><td>Brief Description of the Qualification</td><td colspan="2">A Mechatronics Maintenance Specialist is responsible for installing, testing, and using sensors, actuators, and microcontrollers in the mechatronics system. The individual is also responsible for carrying out the repair and maintenance of the mechatronics system.</td></tr>
<tr><td>9.</td><td>Eligibility Criteria for Entry for Student/Trainee/Learner/Employee</td><td colspan="2">a. Entry Qualification & Relevant Experience:
<table>
<tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Required Experience (with Specialization - if applicable)</th></tr>
<tr><td>1</td><td>UG Diploma in relevant field (Physics/ Electronics/ Electrical/Mechanical)</td><td>1.5 years of relevant experience.</td></tr>
<tr><td>2</td><td>3 years Diploma after 10th (Electronics/Electrical /Mechanical)</td><td>3 years of relevant experience.</td></tr>
<tr><td>3</td><td>Previous relevant qualification of NSQF level 4.5</td><td>1.5 years of relevant experience.</td></tr>
<tr><td colspan="3"># Relevant Experience in Industrial Automation.</td></tr>
</table>
b. Age: NA</td></tr>
<tr><td>10</td><td>Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>19</td><td>11. Common Cost Norm Category (I/II/III) (wherever applicable): I</td></tr>
<tr><td>12</td><td>Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">NA</td></tr>
</table>

<table>
<tr><td>13</td><td>Training Duration by Modes of Training Delivery
(Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="3">☐Offline ☐Online ☒Blended
<table>
<tr><th>Training Delivery Modes</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>OJT Mandatory (Hours)</th><th>OJT Recommended (Hours)</th><th>Total (Hours)</th></tr>
<tr><td>Classroom (offline)</td><td>00:00</td><td>210:00</td><td>180:00</td><td>00:00</td><td rowspan="2">570:00</td></tr>
<tr><td>Online</td><td>180:00</td><td>00:00</td><td>00:00</td><td>00:00</td></tr>
</table>
(Refer Blended Learning Annexure for details)</td></tr>
<tr><td>14</td><td>Aligned to NCO/ISCO Code/s (if no code is available mention the same)</td><td colspan="3">NCO-2015/7412.0101</td></tr>
<tr><td>15</td><td>Progression path after attaining the qualification
(Please show Professional and Academic progression)</td><td colspan="3">Robotics Automation Lead</td></tr>
<tr><td>16</td><td>Other Indian languages in which the Qualification & Model Curriculum are being submitted</td><td colspan="3">Hindi</td></tr>
<tr><td>17</td><td>Is similar Qualification(s) available on NQR-if yes, justification for this qualification</td><td colspan="3">☐ Yes ☒ No URLs of similar Qualifications:</td></tr>
<tr><td>18</td><td>Is the Job Role Amenable to Persons with Disability</td><td colspan="3">☐ Yes ☒ No
If “Yes”, specify applicable type of Disability:</td></tr>
<tr><td>19</td><td>How Participation of Women will be Encouraged</td><td colspan="3">No gender sensitization</td></tr>
<tr><td>20</td><td>Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)</td><td colspan="3">☒ Yes ☐ No
Employability Skills (DGT/VSQ/N0102)</td></tr>
<tr><td>21</td><td>Is Qualification Suitable to be Offered in Schools/Colleges</td><td colspan="3">Schools ☐ Yes ☒ No Colleges ☒ Yes ☐ No</td></tr>
<tr><td>22</td><td>Name and Contact Details of Submitting / Awarding Body SPOC
(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</td><td colspan="3">Name: Saleem Ahmed
Email: ceo@essc-india.org
Contact No.: 011 – 8447738501
Website: https://www.essc-india.org/</td></tr>
<tr><td>23</td><td>Final Approval Date by NSQC: 07.05.2025</td><td>24. Validity Duration: 3 Years</td><td colspan="2">25. Next Review Date: 30.04.2028</td></tr>
</table>

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*

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	Set up circuits and electrical components in the mechatronics system	ELE/N7109 & V2.0	Core	5	7	66	54	90	0	210	30	55	0	15	100	30
2	Install, test and use the sensors and actuators in the mechatronics system	ELE/N7110 & V2.0	Core	5	5	60	60	30	0	150	30	55	0	15	100	30
3	Install, test and use microcontroller in the mechatronics system	ELE/N7111 & V2.0	Core	5	5	30	60	60	0	150	30	55	0	15	100	30
4	Employability Skills (60 hours)	DGT/VSQ/N0102 & V1.0	Non-core	4	2	24	36	0	0	60	20	30	0	0	50	10
Duration (in Hours) / Total Marks					**19**	**180**	**210**	**180**	**0**	**570**	**110**	**195**	**0**	**45**	**350**	**100**

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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: ___% *(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)*	Diploma/Degree (Electronics/Electrical/Mechanical) with 3 years industrial and 2 years training experience in the field of Mechatronics Maintenance. Or Certified in relevant CITS Trade

2	**Master Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	Diploma/Degree (Electronics/Electrical/Mechanical) with 5 years industrial and 2 years training experience in the field of Mechatronics Maintenance. Or Certified in relevant CITS Trade
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)*	Diploma/Degree (Electronics/Electrical/Mechanical) with 5 years industrial and 2 years training experience in the field of Mechatronics Maintenance. Or Certified in relevant CITS Trade
2	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Diploma/Degree (Electronics/Electrical/Mechanical) with 6 years industrial and 2 years training experience in the field of Mechatronics Maintenance. Or Certified in relevant CITS Trade
3	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Diploma/Degree (Electronics/Electrical/Mechanical) with 6 years industrial and 2 years training experience in the field of Mechatronics Maintenance. Or Certified in relevant CITS Trade
4	**Assessment Mode** *(Specify the assessment mode)*	Blended
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):** Yes
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No):** Yes

3.	**Government /Industry initiatives/ requirement (Yes/No):** Yes
4.	**Number of Industry validation provided:** 21
5.	**Estimated nos. of persons to be trained and employed:** 2000
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)*	*Attached*
2.	**Annexure:** List of tools and equipment relevant for qualification *(Mandatory, except in case of online course)*	*Attached*
3.	**Annexure:** Detailed Assessment Criteria *(Mandatory)*	*Attached*
4.	**Annexure:** Assessment Strategy *(Mandatory)*	*Attached*
5.	**Annexure:** Blended Learning *(Mandatory, in case selected Mode of delivery is "Blended Learning")*	*Filled*
6.	**Annexure:** Multiple Entry-Exit Details *(Mandatory, in case qualification has multiple Entry-Exit)*	*Filled*
7.	**Annexure:** Acronym and Glossary *(Optional)*	*Attached*
8.	**Supporting Document:** Model Curriculum *(Mandatory – Public view)*	*Attached*
9.	**Supporting Document:** Career Progression *(Mandatory - Public view)*	*Attached*
10.	**Supporting Document:** Occupational Map *(Mandatory)*	Attached
11.	**Supporting Document:** Assessment SOP *(Mandatory)*	
12.	**Any other document you wish to submit:**	

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	**Demands a wide range of specialised technical skill, clarity of knowledge and practice in a broad range of activity involving standard and non-standard practices.** ● Set up circuits, electrical components and pneumatic system	A Mechatronics Maintenance Specialist is responsible for installing, testing, and using sensors, actuators, and microcontrollers in the mechatronics system.	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	**Basic knowledge of electronics involved in hardware, how to operate the system and other hardware peripherals** ● Set up microcontrollers ● Effective waste management/recycling practices ● Communicate effectively at the workplace	A Mechatronics Maintenance Specialist should know to select an appropriate mechatronics system to solve the given industrial problems, install the mechatronics control system, install the hardware interfacing units of microcontrollers. Hence Level 5	5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	**A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study.** ● Install, test and use actuators	A Mechatronics Maintenance Specialist should be able to carry out troubleshooting for any issues identified with the installed hydraulic and pneumatic actuator as per the sketches and block diagrams Hence Level 5	5
Broad Learning Outcomes/Core Skill	Reasonably good in installing and configuring peripherals. ● Install, test and use sensors	A Mechatronics Maintenance Specialist must have the knowledge to install the selected sensors such as potentiometer sensor following the standard procedure, use the inductive sensor to measure high precision measurements of displacement, distance, oscillation in harsh industrial environments Hence Level 5	5
Responsibility	Responsibility of completing the work assigned and reporting the same as per standards. ● Install, test and use microcontroller ● Maintain and enhance professional competence	A Mechatronics Maintenance Specialist is responsible for installing, testing, and using sensors, actuators, and microcontrollers in the mechatronics system. Hence Level 5	5

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment
Batch Size: 30

S. No.	Tool / Equipment Name	Specifications	Quantity for specified Batch size
1	Whiteboard	pieces	1
2	Marker	pieces	12
3	Projector	pieces	1
4	Laptop	pieces	1
5	Hydraulic and pneumatic systems	pieces	5
6	Pumps systems	pieces	5
7	Mechanical drives	pieces	5
8	Sensors packages	pieces	5
9	Programmable controller systems	pieces	1
10	Motor wiring systems	pieces	5
11	Power distribution kit	pieces	2
12	Motor control systems	pieces	5
13	Basic rotating machines	pieces	5
14	Mechatronics systems	pieces	1
15	Process control systems	pieces	1
16	Thermal process control systems	pieces	2
17	Analytical process control systems	pieces	5
18	AC/DC electrical systems	pieces	5
19	Power & control electronics	pieces	5

Classroom Aids
The aids required to conduct sessions in the classroom are:

1. Whiteboard
2. Projector
3. Computer/Laptop
4. Chairs
5. Tables
6. Whiteboard marker

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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	Nagdeo Education Welfare Society	Vijay Nagdeo	General Manager	Ward No. 11 Junnardeo Dist. Chhindwara M.P. 480551	9425461093	Vijaynagdeo02@gmail.com	
2	Access Edutech Pvt. Ltd.	Sanjay Kumar Mishra	Director	96, Vrindavan Nagar Ayodhya Bypass Road Bhopal	7000650224	sanjaymishra@accessedutech.com	
3	SHIV SHAKTI TECKNIKI EVAM SAMANAYA SHIKSHAN SANSTHAN	Jitendra Kumar Garg	President	B 32 MAHESH NAGAR JAIPUR RAJASTHAN-302015	9782912782	jitendra.garg303@gmail.com	
4	YADUVANSHI PRIVATE ITI	YADVENDRA	PRINCIPAL	TC229199 - YADUVANSHI PVT ITI, HASAMPUR The-NEEMKATHANA DIST-SIKAR RAJASTHAN PIN CODE NO - 332718	8432882688	yaduvanshicollege2008@gmail.com	
5	Involute Technology Pvt. Ltd	S Bataripura	HR		9347280666	bala@involutetraining.com	
6	EdgeFX Technologies Pvt. Ltd	Tarun Agarwal	COO	105, Liberty Plaza, Himayatnagar Hedrabad Telangana 500029		info@edgefxkits.in	
7	VVDN Technology	Subnesh Sharma	Avp HR	Sector 8, IMT Manesar	9821630618	Subnesh.sharma@vvdntech.com	
8	Tata Consultancy Services.	Sheepra Kaushik	Consultant – Product Development	Kensington B Wing, Hiranandani SEZ, Powai, Mumbai 400076	8433595090	sheepra.sharma@tcs.com	

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9	Rastriya Khushali Sansthan	Ramkaran Sinsinwar	President	VOP Tajsar Fatehpur Rajasthan	6350658040	Rkstajsar1998@gmail.com	
10	Nagravision India Pvt. Ltd	Avinash Yadav	System Administrator	RMZ Centennial, Tower C unit 301 and 302, Opp. Graphite India, Mahadevapura Post ITPL Road, 560048 Bangalore, India	9808326626	avinash.yadav@nagra.com	
11	Manav Shiksha			Vill+Post – OlE, Dis. Mathura	7500000637		
12	Polman Instruments Pvt. Ltd.	B S Rao		Telangana	9701689111	sbrao@polman.com	
13	Ephicacy Lifescience Analytics	Rahul Kumar Kaushik	Senior Software Engineer	2nd Main Rd, Sarvobhogam Nagar, Arekere, Bengaluru, Karnataka 560076	8859885973	Rahul.Kaushik@ephicacy.com	
14	Involute Automation Pvt. Ltd	Vijaya Chandra	Operationa In Charge	Plot No. 12 Tecgnocrats Industrial Estate Balanaga, Hyderabad, Telangna 500037 india		Vijaya.chandra@involutetraining.in	
15	Conduent-https://www.conduent.com	Prince Jain	Senior Business Analyst	7 to 9th Floor & 6 to 9th Floor, Building No.5 & 6,Plot No 20&21, Candor Tech Space, IT/ITES SEZ., Noida, Uttar Pradesh 201304	8439385780	prince.jain@conduent.com	
16	Artificial Intelligence Technologies	Rohit Kumar Sharma	Manager – Product Development	A-21, sector 4, Block A, Kailash Colony, Greater Kailash, New Delhi	9927564461	rohit.sharma@aituniversal.com	
17	Vishay Group	Barkath Shaik	HR	Tamilnadu	9841398025		
18	TUS Sunadaram	Ganesh	HR	Tamilnadu	9500127702		
19	Balaji Private ITI	Rakesh Kumar	PRINCIPAL	Moonpur Mundawar Alwar Rajasthan	9829745313	rakeshiti@gamil.com	

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20	Balaji Private ITI	Rakesh Kumar	PRINCIPAL	Moonpur Mundawar Alwar Rajasthan	9829745313	rakeshiti@gamil.com	
21	Nexgen-http://www.nexgenexhibitions.com/	Saurabh Purwar	Director	1201/1206 Pragati Tower, 26 Rajendra Place, New Delhi-110008, India	9457306691	fbvidgo@gmail.com	

Annexure: Training Details

Training and Employment Projections:

Year	Total Candidates	Women	People with Disability
	Estimated Training # Total	Estimated Training # Women	Estimated Training # PwD
2025-26	500	NA	NA
2026-27	500	NA	NA
2027-28	1000	NA	NA

Data to be provided year-wise for next 3 years

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

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
3.0	2022-23	820	782	603	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2023-24	631	599	505	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2024-25	211	179	154	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:

1. PMKVY

Content availability for previous versions of qualifications:

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

Languages in which Content is available: English

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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

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline : Online Ratio
1	☒Theory/ Lectures - Imparting theoretical and conceptual knowledge	• Books/ e-books • Presentations • Reference Material • Audio / Video Modules	30:70
2	☒Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	• Self-Learning Videos • Broadcasts • Mobile Learning • Curated Digital content	30:70
3	☒Showing Practical Demonstrations to the learners	• Video Content • E-Resource library • AR/ VR/ XR	30:70
4	☒Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	• Training tools (tools list attached) • Video Play • Presentations	30:70
5	☒Tutorials/ Assignments/ Drill/ Practice	• Online Question Bank • Mobile Quick test app • MCQ based tests	30:70
6	☒Proctored Monitoring/ Assessment/ Evaluation/ Examinations	• Assessment engine for Essays • Up-loadable file examinations • Mock test sessions	30:70
7	☒On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training	• Online tests • Offline assessments	30:70

Annexure: Detailed Assessment Criteria

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

NOS/Module Name	PC	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
ELE/N7109: Set up circuits and electrical components in the mechatronics system	Set up microcontrollers		15	35		7
	PC1.	select an appropriate mechatronics system to solve the given industrial problem(s) and improve productivity	2	5		1
	PC2.	select the appropriate mechatronics components for the installation of the mechatronics system	2	5		1
	PC3.	test the mechatronics components to ensure they are functioning correctly	2	5		1
	PC4.	install the mechatronics control system	2	5		1
	PC5.	program the microprocessor and microcontroller	2	5		1
	PC6.	install the hardware interfacing units of microcontrollers	2	5		1
	PC7.	test the microcontrollers for the correct functioning and carry out troubleshooting for any issues identified	3	5		1
	Set up circuits, electrical components and pneumatic system		15	20		8
	PC8.	select the appropriate power converter circuits and electrical drives for installation	1	2		1
	PC9.	test the electrical components and circuits for correct functioning and compatibility with the mechatronics system	2	2		1
	PC10.	select the appropriate pneumatic values according to the need	2	1		1
	PC11.	perform sequence control and use the logic functions for operating the pneumatic system	1	1		1
	PC12.	use relays in the pneumatic system	1	1		1
	PC13.	monitor the pneumatic fluid by analyzing the speed and pressure control sensors	1	1		1
	PC14.	carry out troubleshooting for any issues encountered with the pneumatic system	1	1		1
	PC15.	design the cascade circuits	1	2		1
	PC16.	use the appropriate techniques for programming PLC with the help of Ladder diagram	1	1		

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	PC17.	install the pneumatic power system	1	1		
	PC18.	follow the relevant case studies for implementing the pneumatic system in the automatic production line	1	1		
	PC19.	carry out maintenance of the circuits, electrical components and pneumatic system	2	1		
		NOS Total	**30**	**55**		**15**
ELE/N7110: Install, test and use the sensors and actuators in the mechatronics system		Install, test and use sensors	**15**	**30**		**8**
	PC1.	select the appropriate contact or contactless sensors for installation as appropriate	2	3		1
	PC2.	install the selected sensors such as potentiometer sensor following the standard procedure	2	3		1
	PC3.	test the sensors for correct functioning after installation	1	3		1
	PC4.	check the working of the strain gauge sensor and measure the torque applied by the motor	1	3		1
	PC5.	determine the measurement of position and displacement using the eddy current sensor	1	3		1
	PC6.	use the capacitive element by replacing the mechanical buttons	1	3		1
	PC7.	use the inductive sensor to measure high precision measurements of displacement, distance, oscillation in harsh industrial environments	1	3		1
	PC8.	check the position of the piston in the cylinder by using the pneumatic sensor	1	3		1
	PC9.	detect weak infrared irradiation caused by temperature fluctuation by using a pyro-electric sensor	2	3		
	PC10.	measure the electrical potential caused by applying mechanical force to a piezoelectric material by using a piezoelectric sensor	2	2		
	PC11.	carry out repair and maintenance of sensors	1	1		
		Install, test and use actuators	**15**	**25**		**7**
	PC12.	select the appropriate analogue or digital actuators to install in electrical and hydraulic systems to control various physical quantities	2	2		1
	PC13.	install an actuator with the appropriate properties according to the need	2	3		1
	PC14.	use the appropriate interface circuitry to match the actuator to the system driving it	1	2		1

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	PC15.	test the actuator for correct functioning after installation	1	3		1
	PC16.	carry out troubleshooting for any issues identified with the installed hydraulic and pneumatic actuator as per the sketches and block diagrams	1	2		1
	PC17.	debounce the keypads to use the mechanical switches as required	1	2		1
	PC18.	install and use the vane motor as per the standard procedure	1	2		1
	PC19.	control high-powered circuit using a lower power signal through electro-mechanical and solid- state relays	1	4		
	PC20.	use the stepper motor to convert electrical power into mechanical power	2	4		
	PC21.	create analytical design and development solutions for actuators for different applications	2	3		
	PC22.	carry out repair and maintenance of actuators	1	5		
		NOS Total	**30**	**55**	**-**	**15**
ELE/N7111: Install, test and use microcontroller in the mechatronics system		*Install, test and use microcontroller*	**30**	**55**		**15**
	PC1.	select an appropriate microcontroller to install according to the intended application in the mechatronics system	3	6		3
	PC2.	install the microcontroller as per the standard procedure and link the function of microcontroller structure in hardware interfacing units of the mechatronics system	3	6		2
	PC3.	test the microcontroller after installation to ensure it functions as expected	3	6		2
	PC4.	program the microcontroller to execute a specific set of instructions	3	6		2
	PC5.	test the functioning of the machine using the mechatronics system	3	6		1
	PC6.	carry out interfacing of Analog-To-Digital (A/D) and Digital-To-Analog (D/A) convertors using the appropriate type of microcontroller	4	6		1
	PC7.	compose and program stepper motor using the appropriate type of microcontroller	4	6		1
	PC8.	compose and program Advanced RISC Machine (ARM) and microprocessor with stepper motor	4	6		1
	PC9.	carry out repair and maintenance of microcontrollers	3	7		2
		NOS TOTAL	**30**	**55**	**-**	**15**

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DGT/VSQ/N0102 - Employability Skills (60 hours)	Introduction to Employability Skills		1	1	-	
	PC1.	identify employability skills required for jobs in various industries	-	-		
	PC2.	identify and explore learning and employability portals	-	-	-	
	Constitutional values – Citizenship		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	-	-	-	
	Becoming a Professional in the 21st Century		2	4		
	PC5.	recognize the significance of 21st Century Skills for employment	-	-	-	
	PC6.	practice the 21st Century Skills such as Self- Awareness, Behavior 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	-	-		
	Basic English Skills		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	-	-	-	
	Career Development & Goal Setting		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	-	-	-	
	Communication Skills		2	2	-	
			-	-	-	

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	PC12.	follow verbal and non-verbal communication etiquette and active listening techniques in various settings				
	PC13.	work collaboratively with others in a team	-	-		
		Diversity & Inclusion	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	-	-	-	
		Financial and Legal Literacy	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	-	-	-	
		Essential Digital Skills	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	-	-	-	

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	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	-	-	-	
		Total Marks	20	30	-	
Grand Total			**110**	**195**	**-**	**45**

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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 SDMS/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:
   - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
   - Check the duration of the training.
   - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
   - 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.
   - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
   - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
   - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:
   - Question papers created by the Subject Matter Experts (SME)
   - Question papers created by the SME verified by the other subject Matter Experts
   - Questions are mapped with NOS and PC
   - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
   - Assessor must be ToA certified & trainer must be ToT Certified
   - Assessment agency must follow the assessment guidelines to conduct the assessment

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
   - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
   - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:
   - Surprise visit to the assessment location
   - Random audit of the batch
   - Random audit of any candidate

6. Method for assessment documentation, archiving, and access

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- Hard copies of the documents are stored
- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

On the Job:

1. Each module (which covers the job profile of Mechatronics Maintenance Specialist) will be assessed separately.
2. The candidate must score 50% 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 performing Soft Skills effectively:
    - Videos of Trainees during OJT
    - Answer Sheets of Question Banks
    - Assessing the Log Book entries of Trainees at Employer location
    - Employer Performance Feedback.
4. Assessment of each Module will ensure that the candidate is able to:
    - Understand the importance of understanding production requirements.
    - Understand the practical aspect of the process used on the Assembly line.
    - Basic health and safety practice.

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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 defines 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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