सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
DEVELOPMENT COMMISSIONER
MINISTRY OF MICRO, SMALL & MEDIUM ENTERPRISES

MSME TECHNOLOGY CENTRE

Please refer Guidelines for STT/LTT/Apprenticeship/OEM Qualification File

QUALIFICATION FILE

ASSISTANT MECHATRONICS SYSTEM DESIGNER

☐ 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

Submitted By:
MSME TECHNOLOGY CENTRE
O/o DC MSME, Ministry of Micro, Small and Medium Enterprises
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Section 1: Basic Details

1.	**Qualification Name**	**ASSISTANT MECHATRONICS SYSTEM DESIGNER**	
2.	**Sector/s**	**Capital Goods & Manufacturing**	
3.	**Type of Qualification: ☐ New ☒ Revised ☐ Has Electives/Options ☐OEM**	**NQR Code & version of existing/previous qualification:** *(change to previous, once approved)* MSME/PDIM/09	**Qualification Name of existing/previous version:** **Post Diploma in Mechatronics**
4.	**a. OEM Name** **b. Qualification Name** (*Wherever applicable)*	**NA** **Sr. Mechatronics System Designer**	
5.	**National Qualification Register (NQR) Code & Version** (*Will be issued after NSQC approval)*	QG-05-IT-04171-2025-V1-MSMETC	**6. NCrF/NSQF Level: 5**
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**	The qualification contains different modules which are required for the job role of SR. Mechatronics System Designer, This qualified learner shall be able to: ● Design and operate the mechatronics system. ● Prepare and execute logic using PLC / SCADA programming. ● Prepare Electrical system drawing ● Use and control the system using pneumatics and Hydraulic ● Design industrial Pneumatic layout and circuit diagram	

<table>
<tr><td></td><td></td><td>

Design Electro - Pneumatic layout and circuit diagram
Design hydraulic system layout and circuit diagram
Design hydraulic system circuit diagram
Control panel design for PLC, SCADA, HMI, Motor and drive
Mechatronics system design for industrial automation
To get an employment in Engineering/ Manufacturing industries and also become an entrepreneur

</td></tr>
<tr><td>9.</td><td>Eligibility Criteria for Entry for Student/Trainee/Learner/Employee</td><td>
a. Entry Qualification & Relevant Experience: Diploma or Degree in Mechanical / Electrical / Electronics / Instrumentation / Equivalent.
<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>3 year Diploma after 10th</td><td>-</td></tr>
<tr><td>2</td><td>Previous relevant Qualification of NSQF Level 4.5 in relevant field</td><td>1.5 year relevant experience</td></tr>
<tr><td>3</td><td>Previous relevant Qualification of NSQF Level 4 in relevant field</td><td>3 year relevant experience</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td colspan="2">b. Age: 18 Years</td></tr>
<tr><td>10.</td><td>Credits Assigned to this Qualification, Subject to Assessment(as per National Credit Framework (NCrF))</td><td>20</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>
<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="2">☐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>450</td><td>570</td><td>60</td><td>-</td><td>1080</td></tr>
<tr><td>Online</td><td>120</td><td>-</td><td>-</td><td>-</td><td>120</td></tr>
<tr><td>Total</td><td>570</td><td>570</td><td>60</td><td>-</td><td>1200</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="2">7412.01(Automation Specialist)</td></tr>
<tr><td>15.</td><td>Progression path after attaining the qualification (Please show Professional and Academic progression)</td><td colspan="2">Professional/Career Progress: Supervisor</td></tr>
<tr><td>16.</td><td>Other Indian languages in which the Qualification & Model Curriculum are being submitted</td><td colspan="2">Hindi</td></tr>
<tr><td>17.</td><td>Is similar Qualification(s) available on NQR-if yes, justification for this qualification</td><td colspan="2">☐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="2">☒ Yes ☐ No
If “Yes”, specify applicable type of Disability: As per Govt. norms.</td></tr>
<tr><td>19.</td><td>How Participation of Women will be Encouraged</td><td colspan="2">Seats are reserved as per government Norms.</td></tr>
<tr><td>20.</td><td>Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)</td><td colspan="2">☒Yes ☐No
The said aspect is covered in the module name Employability Skills.</td></tr>
<tr><td>21.</td><td>Is Qualification Suitable to be Offered in Schools/Colleges</td><td colspan="2">Schools ☐ Yes ☒ No Colleges ☒ Yes ☐ No
Subject to availability of resources.</td></tr>
</table>

22.	**Name and Contact Details of Submitting / Awarding Body SPOC** *(In case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**Name: Sh. Vijay Mahipatrao Bankar** **Contact No. +0755 3501078** **Email-msmetcab@gmail.com**	
23.	**Final Approval Date by NSQC: 8th May 2025**	**24. Validity Duration: 3years**	**25. Next Review Date: 8th May 2025**

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*

Semester - 1

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	Fundamentals of Mechatronics system	MSME/SMSD/01	Core	5	3	60	30	-	-	90	100	-			100	
2	Demonstrate of Industrial Automation Sensors	MSME/SMSD/02	Core	5	4	60	60			120	100	100			200	
3	Develop Automation Logics using PLC	MSME/SMSD/03	Core	5	4	30	90			120	-	100			100	
4	Develop Hydraulics & Pneumatics circuit for Mechatronics system	MSME/SMSD/04	Core	5	4	60	60			120	100	100			200	
5	Create & Modify the Electrical circuit & mechanical drawing using CAD software	MSME/SMSD/05	Core	5	3	-	90			90	-	100			100	
6	Employability skills	MSME/ES/02	Non-Core	5	2	60				60						
Duration (in Hours) / Total Credit / Marks					**20**	**270**	**330**	**-**	**-**	**600**	**300**	**400**	**-**	**-**	**700**	

Semester - 2

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	Demonstrate of electrical Motors and Drives	MSME/SMSD/06	Core	5	3	60	30			90	100	-			100	
2	Application of Embedded technology for Mechatronics system	MSME/SMSD/07	Core	5	4	60	60			120	100	100			200	
3	Engineering Metrology and Quality Control	MSME/SMSD/08	Core	5	3	60	30			90	100	-			100	
4	Application of SCADA and HMI in Mechatronics system	MSME/SMSD/09	Core	5	3	30	60			90	-	100			100	
5	Mechatronics System design	MSME/SMSD/10	Core	5	5	30	60	60		150	-	100			100	
6	Employability skills	MSME/ES/02	Non-Core	5	2	60	-			60	100				100	
Duration (in Hours) / Total Credit / Marks					20	300	240	60		600	400	300			700	

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)*
-	-	-														

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)*

Assessment - Minimum Qualifying Percentage:

Specify any one of the following:

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

Minimum Marks to pass Theory Exam: 40%
Minimum Marks to pass Practical Exam: 60%

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.)*

Minimum Marks to pass Theory Exam: 40%
Minimum Marks to pass Practical Exam: 60%

Section 3: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years)***(as per NCVET guidelines)*	Degree in Electrical Engineering or Electronics Engineering or Mechanical Engineering or MSc. Electronics or Equivalent with Practical skills and knowledge required in the relevant job role at least one level higher i.e level 5 and above in related field and minimum 2 years of experience in Tool Room/ Technology Centre of MSME or any reputed industry will become a trainer, Or in accordance with the TOT guideline of NCVET
2.	**Master Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	Degree in Engineering (Mechanical/ Production/Manufacturing Technology) or MSc. Electronics or equivalent with 3 to 5 years of experience in Electrical / Electronics / Mechatronics / Training/ Design Department from Tool Room/ Technology Centre of MSME or any reputed industry will become as a Master Trainer, Or in accordance with the TOT guideline of NCVET
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**	Yes

Section 4: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Degree in Engineering (Mechanical/ Electrical/ Electronics/Mechatronics) or MSc. Electronics or equivalent with 3 years of experience in Electrical / Electronics / Production/ Training/ Design Department from Tool Room/ Technology Centre of MSME or any reputed industry. Only (TOA) certified assessors will be able to conduct the assessments.
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Degree in Engineering (Mechanical/ Electrical/ Electronics / Mechatronics) or MSc. Electronics or equivalent With 5 years of experience in Electrical / Electronics / Production/ Training/ Design Department from Tool Room/ Technology Centre of MSME or any reputed industry.

3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Post Graduate in the relevant discipline with minimum 5 years of experience in Electrical / Electronics / Production/ Training/ Design Department from Tool Room/ Technology Centre of MSME or any reputed industry.
4.	**Assessment Mode***(Specify the assessment mode)*	**Blended Type (Online + Offline)**
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,** MSDE's Skill Assessment and Anticipation Study Report
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No): Yes** https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce
3.	**Government /Industry initiatives/ requirement (Yes/No):**Yes
4.	**Number of Industry validation provided:**
5.	**Estimated nos. of persons to be trained and employed: Approx. 2000 per Year**
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)*	*Annexure-I*

2.	**Annexure:** List of tools and equipment relevant for qualification *(Mandatory, except in case of online course)*	*Annexure-II*
3.	**Annexure:** Industry Validations Summary	*Annexure-III*
4.	**Annexure:** Training & Employment Details	*Annexure-IV*
5.	**Annexure:** Blended Learning *(Mandatory, in case selected Mode of delivery is "Blended Learning")*	*Annexure-V*
6.	**Annexure:** Detailed Assessment Criteria *(Mandatory)*	*Annexure-VI*
7.	**Annexure:** Assessment Strategy *(Mandatory)*	*Annexure-VII*
8.	**Annexure:** Acronym and Glossary *(Optional)*	*Annexure- VIII*
9.	**Annexure:** Multiple Entry-Exit Details *(Mandatory, in case qualification has multiple Entry-Exit)*	*NA*
10.	**Supporting Document:** Model Curriculum *(Mandatory – Public view)*	*Annexure- IX*
11.	**Supporting Document:** Career Progression *(Mandatory - Public view)*	*This aspect mentioned in point no. 15*
12.	**Supporting Document:** Occupational Map *(Mandatory)*	*Annexure-X*
13.	**Supporting Document:** Assessment SOP *(Mandatory)*	*Annexure- XI*
14.	Any other document you wish to submit:	*NA*

Annexure: 1 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	To have broad knowledge of Automation integrator, Mechatronics systems designer, Motor and Drives, Sensors, hydraulics & Pneumatics.	The job holder will have theoretical knowledge in the areas of Industrial automation system integrator, mechatronics system designer, AC drive programming and commissioning, Sensors connection, installation and testing, component, working of different components, the functions of element / component, Programming and integration of PLC, SCADA, HMI Motor and drives,	5
Professional and Technical Skills/ Expertise/Professional Knowledge	To apply Mechatronics principles Design, integration, installation and commissioning of Mechatronics systems for industrial automation	•The job holder will design mechatronics system for industrial automation •The job holder will Design, simulate, and implement complex mechatronics systems. •The job holder will further identifying classified problems of the system by using the measuring instruments and electrical and electronics tools such as multimeter (voltage, current, resistance), megger tester, earth tester, continuity tester, tong tester, by checking the existing Programmes of particular controller. •Job holder will apply his/her command of wide ranging mechatronics theoretical skills and knowledge of basics of electricity, behavior of current flowing through the system, controller used in particular system and the basics of programming concept of particular controller to identify the problems in the system. •The job holder will further formulate the identified problems of the system by applying his/her knowledge of relationship between facts and theory of particular system, mathematical calculations on laws and theorems of particular system, practice on solving numerical by considering the specification of component used in the system, calculations to match input-output characteristics with particular controller i.e. voltage ratings, current ratings and power ratings, frequency	5

		calculations such as low frequency and high frequency circuits, calculations of communication protocols, calculations for logical design using logic gates while doing program interface, calculations of output voltage waveform of signal conditioning circuits. •The job holder will develop solutions for particular maintenance problems which is already classified, identified and formulated by him/her.	
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Understand Personal Strengths \ Value ,Digital Literacy, Money Matters and Preparing for Employment & Self Employment	Learner can Develop communication competence, report writing skills & preparation of Resumes or Curriculum Vitae, Learner can be able to Interact effectively with co-workers and can apply the Engineering Ethics and Human Values at workplace. Leaner can understand the basic process of becoming an entrepreneur &start up and can get benefits from various government schemes applicable.	4.5
Broad Learning Outcomes/Core Skill	To use mathematical skills for solving specific problems.	Job holder will work on internal projects during his sessions where he/she shall gather accurate information on project concept and requirements, Confirm the project objectives, preparation of conceptual plan, selection of software based on capabilities of modelling, use Presentation skills, utilize Mechatronics Software, communicate clearly about the project requirement to the group members through written /verbal/e mail etc. as per organizational standard, identify different design options which will meet requirements and design specification, Develop solution to the specific problems like setting the cycle time, mechanical adjustments of the system, matching the programme output with the requirement using latest technology example PLC Programming, Electrical CAD, Mechatronics assistant. Carry out mathematical calculation required to solve a specific problem	4.5

		like calculation of working pressure for the system, finding out the size of cylinder required for the application, calculating the size of the valves etc.	
	To Communicate Effectively	The job holder will communicate clearly about the project and other requirement to the group members through written /verbal/e mail etc. as per organizational standard, identify different design options which will meet requirements and design specification.	
	Develop entrepreneurship skills	Qualification holder explains Meaning and importance of entrepreneurship, Describes Motivations and reasons to start business, Explains: Entrepreneurial process, Entrepreneurship framework, Role of information in opportunity recognition, Emergence of entrepreneurship, Entrepreneurial personality, Meaning and importance of start-up factors of entrepreneurship, Financial planning, Stages of growth of entrepreneurial ventures, Strategic management process, Linkage of strategy and entrepreneurship, Concept of intellectual property, Role perspective of intellectual property concept in entrepreneurship, •Lists Entry barriers, Barriers to growth, Advantages and disadvantages of family businesses ,Recognize Significance and associated details of new ventures, Carry out Organizational planning, Describe Meaning and importance of various organizational structures in new ventures,	
Responsibility	To work as individual & member of inter discipline team in the management supervision.	•Job holder obtains sources of information and recognizes information, Uses and draw up technical drawings and documents, Uses documents and technical regulations and occupationally related provisions, Conducts appropriate and target oriented discussions with higher authority and within the team.	4.5

		Recommendations or remarks from the higher authority is the learning source for the job holder. •Job holder Presents facts and circumstances, possible solutions & uses English special terminology, Resolve disputes within the team. •Job holder shall encourage team members for continues learning by time to time discussing with them for project like integration, design, installation and testing •Job holder shall follow work standard, specific norms and procedures laid down by the organization. Job holder shall develop moral, values and ethical practices in business operation.	
	To observe & follow safety	Job holder Follows and maintains procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy. He/she Recognizes and reports all unsafe situations according to site policy. Identifies and take necessary precautions on fire and safety hazards and report according to site policy and procedures. Identifies, handles and stores / dispose of dangerous goods and substances according to site policy and procedures following safety regulations and requirements. He/she Identifies and observes site policies and procedures in regard to illness or accident, safety alarms accurately. •Job holder reports to competent authority or health and safety Manager or Management representative for health and safety in the event of accident or sickness of any staff and record accident details correctly according to site	

		accident/injury procedures, communicates site evacuation procedures according to site policy to his subordinates. •Job holder demonstrates the use Personal Productive Equipment (PPE) and use the same as per related working environment, he/she uses the basic first aid under different circumstances, demonstrates the use of different fire extinguisher and use the same as per requirement, Identifies environmental pollution & contribute to the avoidance of instances of environmental pollution. He/she deploys environmental protection legislation & regulations. Uses energy and materials in an environmentally friendly manner and demonstrates others to do same. Avoids waste and dispose waste as per procedure, recognize different components of 5S and apply the same in the working environment.	
	To have business ethics & values.	• Job holders shall follow work standards, specific norms and procedures laid down by the organization. Job holders shall develop moral, values and ethical practices in business operations. • The job holder will follow self-discipline, confidentiality, integrity in the work, Maintain / understand organization culture & perform accordingly. He / She Contributes in the attainment organization, mission, vision, policies & core values, Execute behavior of best citizen & member of organization while following professional practices.	

Annexure: II Tools and Equipment (Lab Set-Up)

List of Tools and Equipment for Batch Size: 20

S. No.	Tools / Equipment Name	Specification	Quantity for specified Batch size
1	PLC with HMI Training Kits	Industry Standard	5
2	Advanced PLC Training Kits		3
3	Mechatronics Training Kits		1
4	Pneumatics & Hydraulics Training Kits		1
5	Electro – Pneumatic Training Kits		1
6	SCADA Software		20
7	Motors and Drive Training Kits		3
8	Desktop / Computer system With LAN		20
9	PIC Microcontroller Training Kit and MPLABX IDE (Latest Version)		10
10	ARM Processor Training Kit and Keil uvision Software (Latest Version)		10
11	Arduino Board		10
12	CAD-Auto CAD Software		20 Seats
13	Sensors: Inductive proximity sensor, Capacitive Proximity sensor, Photo electric proximity sensor, Temperature sensor RTD, Thermo couple, Thermistor, IR thermometer, Pressure sensor,		1 Set

14	**Measuring Instruments:** Multi-meter, Vernier Calliper, Micrometre: External & Internal, Height Gauge, Dial Indicators (Lever type & Plunger type), Profile Projector, Different types of Gauges		1 Set
15	**Cutting tools:** Wire cutter, wire stripper, Nose plier,		1 Set
16	Contactor, Relay, Solid state relay (SSR), Tester,		1 set
17	**Hand Tools:** Centre punches, Hammers, Combination Plier, set of number punches, set of double ended spanners, set of box spanners with ratchet handle, Adjustable spanner, set of screw drivers, Nylon / Soft hammer, set of hexagonal Allen keys, cutting files: flat, round, half round, square and triangular		1 set
18	**Others Miscellaneous items for workshop / Lab :**Industry hand gloves, Apron, Safety goggles, Bench vice, Magnetic stand for dial indicators, Spring dividers, Angle Plates, Scribing blocks, Vice mounted tables, Scrap box, Tool storage trolley, Set of soft jaws, Power Saw, Surface plate, Oil stone , Hand pallet truck and First aid kit.		1 set
19	**General Equipment for Classroom**: White Board, Smart Board, Duster, Marker, Multimedia /LCD Projector, Audio Video Aids, Pen drive and Practice exercise etc.		1 set

Annexure III: 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							
2							
3							
4							
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Annexure IV: Training & Employment Details

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Training and Employment Projections:

31							
32							
33							
34							
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40							
41							
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45							
46							

47							
48							
49							

Year	Total Candidates		Women		People with Disability	
	Estimated Training	Estimated Employment Opportunities	Estimated Training	Estimated Employment Opportunities	Estimated Training	Estimated Employment Opportunities
2024-2025	3000	2500	300	210	-	-
2025-2026	4000	3000	400	280	-	-
2026-2027	5000	3500	500	350	-	-

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
1.0	20-21									-	-	-	-
1.0	21-22									-	-	-	-
1.0	22-23									-	-	-	-

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. Fee based Training Program under the Ministry of MSME.
2.
3.
4.

Content availability for previous versions of qualifications:

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

Languages in which Content are available:

English

Annexure V: 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/wp-content/uploads/2023/01/Guidelines-for-Blended-Learning-for-Vocational-Education-Training-Skilling.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 with 2D and 3D animation Self-Learning Videos /Broadcasts /Mobile Learning /Curated Digital content	40:60
2	☐Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	Self-Learning Videos , Broadcasts, Mobile Learning , Curated Digital content	40:60

3	☐Showing Practical Demonstrations to the learners	Pneumatic and Hydraulic simulation software, PLC Programming software with Simulators/ CAD Software, Video Content , E-Resource library	100:0
4	☐Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Electrical wiring diagram, control panel design, Mechatronics system design for industrial automation, Interfacing of PLC, SCADA, HMI and electro – pneumatic , PLC Programming software with Simulators / Pneumatic and hydraulic simulation software / CAD Software / SCADA software	100:0
5	☐Tutorials/ Assignments/ Practice	Question Bank, Quick test app, MCQ based tests, Practical Test on Machines	40:60
6	☐Proctored Monitoring/ Assessment/ Evaluation/ Examinations	Assessment engine for Essays, Up-loadable file examinations, Mock test sessions	50:50

Annexure VI: Detailed Assessment Criteria

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

NOS/Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS / Module: **MSME/SMSD/01** **Fundamentals of Mechatronics system**	PC.1 The system performs its intended tasks effectively. PC.2 All subsystems (mechanical, electrical, and software) work seamlessly together	**100**			

	PC.3 Accurate measurement and control of system parameters (e.g., position, speed, temperature). PC.4 All subsystems (mechanical, electrical, and software) work seamlessly together. PC.5 Optimal power consumption for the tasks performed. PC.6 Seamless integration of hardware and software components. PC.7 Error tolerance and recovery mechanisms in case of failures. PC.8 Balance between performance and production/operational costs. PC.9 Fail-safe mechanisms to protect users and the system. PC.10 Long service life with minimal wear and tear. PC.11 Minimization of emissions, noise, and waste.				
NOS / Module: MSME/SMSD/02 Demonstrate of Industrial Automation Sensors	PC.1 Describe measurement unit of electrical and Mechanical parameters PC.2 Explain different types of temperature sensors RTD, Thermo couple, thermistor and IR thermometer PC.3 Describe units and standards. PC.4 Discuss errors in measurement. PC.5 Explain characteristics of transducers. PC.6 Classify the transducers. PC.7 Describe functioning of different temperature measuring instruments. PC.8 Explain working of different gauges.	100	100	-	-

	PC.9 Explain working of different transducers. PC.10 Differentiate between different transducers. PC.11 List functions of transducers. PC.12 List smart sensors PC.13 Differentiate between smart sensors and others. PC.14 Give applications of smart sensors. PC.15 List types of actuators. PC.16 Describe the function of each type of actuator. PC.17 Differentiate between mechanical, electrical and other actuators. PC.18 Give applications of each type of actuator. PC.19 Demonstrate operation of different motors such as PMDC Motor, Stepper motor, three phase squirrel cage induction motor, three phase permanent magnet synchronous motor, servo motor				
NOS / Module: MSME/SMSD/03 Develop Automation Logics using PLC	PC.1 Understand the concept of industrial automation. PC.2 List the advantages and disadvantages of automation. PC.3 Describe different control systems. PC.4 Understand & draw various electrical symbols. PC.5 Draw and explain one line diagram for different situations. PC.6 List the different field devices. PC.7 List the different field devices. PC.8 Explain the working of a relay. PC.9 Describe the construction of a relay.	-	100	-	-

	PC.10 Explain the importance of relay. PC.11 Give applications of relay in industrial circuits. PC.12 Demonstrate the hardware configuration of PLC. PC.13 Understand the addressing of inputs and outputs in PLC. PC.14 Explain the environment of PLC software. PC.15 Demonstrate the software installation. PC.16 Develop the program in the PLC with different formats. PC.17 Understand the output of a program. PC.18 Use the different internal peripherals of PLC. PC.19 Demonstrate the networking of the PLC. PC.20				
NOS / Module : **MSME/MCCM/03** Create & Modify the Electrical circuit diagram using CAD software	PC.1 Understand Procedure to be adopted for computer aided drawings PC.2 Describe co-ordinate system PC.3 Understand the applications of co-ordinate system PC.4 Use the AutoCAD workspace and user interface. PC.5 Use the AutoCAD workspace and user interface. PC.6 Optimize commands effectively PC.7 Use more advanced editing and construction techniques. PC.8 Add parametric constraints to objects. PC.9 List the steps of Computer aided electrical drawing. PC.10 Use the Electrical CAD workspace and user interface. PC.11 Use the Electrical CAD workspace and user interface. PC.12 Draw various electrical circuits using CAD software. PC.13 Build intelligent ladder diagrams and panel layouts.	-	100	-	-

	PC.14 Insert and edit parametric PLC modules, nonparametric PLC modules, and Stand-alone PLC I/O points				
NOS / Module : MSME/SMSD/04 Develop Hydraulics & Pneumatics circuit for Mechatronics system	PC.1 List different energy supply elements relate to hydraulics & pneumatics. PC.2 Identify the hydraulics & pneumatic power system elements relate to hydraulics & pneumatics. PC.3 Identify the hydraulics & pneumatic power system elements. PC.4 Select appropriate elements / components / symbols for the given process. PC.5 Select different standard elements PC.6 Recommend variation within the standards, symbols. PC.7 Describe the functioning of different elements, systems PC.8 Differentiate between systems. PC.9 Perform basic mathematical calculation required for cylinder speed. PC.10 Select appropriate Hydraulic Pump. PC.11 Describe the functioning of different control valves. PC.12 Identify different type of control valves & accessories PC.13 Discuss applications & advantages of hydro -pneumatic systems PC.14 Design the conceptual hydraulic and pneumatic circuit diagram. PC.15 Simulate the circuit diagrams.	100	100	-	-

	PC.16 Identify different electrical, pneumatic, hydraulic elements PC.17 Apply logic & creativity to design circuits. PC.18 Analyze the simulation results. PC.19 Communicate the simulation results PC.20 Design the programmable circuit sequence PC.21 Analyze stepper control outputs. PC.22 Explain servo controls applications. PC.23 Design circuits with proportional valves. PC.24 Design cartridge valves PC.25 Troubleshoot faults in system components. PC.26 Follow safety standards. PC.27 Follow safety standards. PC.28 Suggest remedy for the fault.				
NOS / Module : **MSME/SMSD/05** Create & Modify the Electrical circuit & mechanical drawing using CAD software	PC.1 Understand Procedure to be adopted for computer aided drawings PC.2 Describe co-ordinate system PC.3 Understand the applications of co-ordinate system PC.4 Use the AutoCAD workspace and user interface. PC.5 Use the AutoCAD workspace and user interface. PC.6 Optimize commands effectively PC.7 Use more advanced editing and construction techniques. PC.8 Add parametric constraints to objects. PC.9 List the steps of Computer aided electrical drawing. PC.10 Use the Electrical CAD workspace and user interface.	-	100		

	PC.11 Use the Electrical CAD workspace and user interface. PC.12 Draw various electrical circuits using CAD software. PC.13 Build intelligent ladder diagrams and panel layouts.				
NOS / Module : **MSME/ES/01** **Employability skills**	PC.1 Explain the major applications of MS Office PC.2 Explain the different types of e-commerce PC.3 List the benefits of e-commerce for retailers and customers PC.4 Discuss how the Digital India campaign will help boost e-commerce in India PC.5 Write applications pertaining to various matters. PC.6 Explain power of positive attitude and Importance of commitment PC.7 Explain motivation and the Ways to motivate oneself and Personal goal setting PC.8 Explain the Effective & Level of Communication PC.9 Explain communication and Significance of technical communication? PC.10 Explain the methods of listening Skills. PC.11 Explain the differences between bio-data, CV and Resume.				

	PC.12 Explain verbal and non-verbal Communication				
NOS / Module : **MSME/SMSD/06** **Demonstrate of electrical Motors and Drives**	PC.1 Explain the working principles of different types of electric motors (e.g., DC motors, AC motors, synchronous motors, and induction motors). PC.2 Describe the construction and operating characteristics of various electric motors. PC.3 Choose suitable electric motors and drives for specific applications based on load requirements, speed, and torque characteristics. PC.4 Explain the importance of efficiency, power factor, and thermal management in motor and drive systems. PC.5 Analyze the performance characteristics of motors under different operating conditions. PC.6 List types of motor PC.7 Demonstrate operation of different motors such as PMDC Motor, Stepper motor, three phase squirrel cage induction motor, three phase permanent magnet synchronous motor, servo motor PC.8 Describe the function of each type of motor. PC.9 Describe different motor control techniques, such as scalar control, vector control, and direct torque control (DTC). PC.10 Understand open-loop and closed-loop control systems in motor drives.	100	100		

	PC.11 Understand the role and types of electric drives in controlling motor speed, torque, and position. PC.12 Explain the components of drive systems, including controllers, converters, and power electronics. PC.13 Evaluate motor-drive combinations for optimal performance and energy efficiency. PC.14 Design and implement basic motor control circuits using power electronics components PC.15 Integrate electric motors and drives into systems requiring precise motion control. PC.16 Familiarize yourself with international standards for electric motors and drives, such as IEC and NEMA. PC.17 Apply safety practices when working with high-power motors and drive systems. PC.18 Identify and reduce energy losses in motor-drive systems. PC.19 Implement energy-efficient drive systems for industrial and commercial applications. PC.20 Diagnose and resolve issues in motor-drive systems using diagnostic tools and techniques.				
NOS / Module : **MSME/SMSD/07** Application of Embedded technology for Mechatronics system	PC.1 Identify the roles and functions of key hardware components in embedded systems, such as microcontrollers, processors, memory, sensors, and actuators.	100	100		

	PC.2 Understand microcontroller architecture and its role in embedded systems. PC.3 Understand the working principles of peripheral devices and their integration with embedded systems. PC.4 Explain the importance of embedded software and firmware in controlling hardware components. PC.5 Learn the fundamentals of communication protocols like UART, I2C, SPI, CAN, and wireless protocols (e.g., Bluetooth, Zigbee). PC.6 Explain how these protocols enable data exchange between components in an embedded system. PC.7 Write, debug, and optimize embedded programs using low-level programming languages like C PC.8 Use development tools such as IDEs, debuggers, and simulators to create embedded applications. PC.9 Design and implement interfaces between microcontrollers and external peripherals such as sensors, actuators, and displays. PC.10 Design scalable and modular embedded systems for complex applications. PC.11 Interfacing of sensor, relay, motors to microcontroller. PC.12 Test and troubleshoot embedded systems for performance and reliability. PC.13 Write and debug embedded programs using C or Python.				

	PC.14 Use development tools like IDEs, debuggers, and emulators for embedded programming.				
NOS / Module : **MSME/SMSD/08** Engineering Metrology and Quality Control	PC.1 Define engineering metrology and explain its importance in manufacturing and quality control PC.2 Identify and describe the fundamental principles of measurement and dimensional analysis. PC.3 Understand the role of advanced measurement techniques such as laser-based systems and optical metrology. PC.4 Understand the process of calibration and its role in ensuring measurement accuracy. PC.5 Use various measuring instruments to measure dimensions, surface finish, and tolerances. PC.6 Design and implement quality control processes in a manufacturing environment. PC.7 Integrate metrology principles into the design, production, and inspection stages of manufacturing. PC.8 Develop inspection plans and procedures for ensuring product quality. PC.9 Familiarize yourself with international standards like ISO, ASME, and ANSI for quality and measurement systems. PC.10 Evaluate and optimize manufacturing processes to improve quality and reduce waste. PC.11 Diagnose and troubleshoot measurement and quality-related issues in engineering systems.	100			

	PC.12 Understand and apply the principles of continuous improvement (Kaizen) in quality management. PC.13 Apply statistical tools such as control charts, histograms, and process capability analysis. PC.14 Conduct experiments to evaluate the accuracy and precision of measurements. PC.15 Implement corrective actions based on quality control feedback.				
NOS / Module : **MSME/SMSD/09** Application of SCADA and HMI in Mechatronics system	PC.1 Understand the need of SCADA system in automation. PC.2 Differentiate between PLC & SCADA. PC.3 Describe the application of the SCADA system. PC.4 Understand procedure of installing the SCADA software. PC.5 Create new application in software in SCADA. PC.6 Work on graphic designer window in SCADA. PC.7 Create and modify graphic display with animation in SCADA. PC.8 Detect the fault in the production system by using the SCADA software PC.9 Understand the details of process tags and internal tags in SCADA PC.10 Apply the LAD programming on SCADA projects. PC.11 Use the property setting of tags in SCADA. PC.12 Apply standard and other objects for the graphic design. PC.13 Create a SCADA picture window related to any process.		100		

	PC.14 Develop multi screens. PC.15 Apply LAD program to simulate the screen designed. PC.16 Use the different tags in a project. PC.17 Understand the concept of logging system in SCADA. PC.18 Understand the principles of message system. PC.19 Create on line trend. PC.20 Develop a new system. PC.21 Interface field devices with the SCADA system. PC.22 Simulate the designed SCADA system				
NOS / Module : **MSME/SMSD/10** Mechatronics System design	PC.1 Understand the Mechatronics project kits and its components. PC.2 Understand the mechanical set up, electrical connection, pneumatics connection PC.3 Understand the trouble shooting of all the kits. PC.4 Discuss about input outputs of the kits. PC.5 Understand the interfacing of PLC with robotics. PC.6 Understands the working ,principle and how actually robot is working PC.7 Process of designing a Mechatronics process PC.8 Identify electrical/ hydraulics/ pneumatics components. PC.9 Explain Mechatronics system and illustrate its relevance in engineering design		100		

NOS / Module: **MSME/ES/02** Employability skills	PC.1 Explain how to face an interview. PC.2 Explain team work, group work, team formation process PC.3 How to Minimize the team conflicts PC.4 Explain Ethics & values PC.5 Explain the concept of entrepreneurship, and entrepreneurship v/s Management PC.6 Explain the process of project report preparation for setting up a new business PC.7 Explain the role of various schemes and institute for self-employment i.e MSME, DIC, NSIC, SIDBI etc, PC.8 Role of financial institution to support startup PC.9 Discuss the importance of saving money PC.10 Discuss the main types of bank accounts PC.11 Differentiate between fixed and variable costs PC.12 Describe the different types of insurance products PC.13 Discuss the main types of electronic funds transfers	100	-	-	-
	Total Marks			-	-

Annexure VII: 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 are assigned to the MSME NSQF Assessment Agency via email for the assessment.

- MSME NSQF Assessment Agency sends the assessment confirmation to respective TC.
- MSME NSQF Assessment Agency deploys the certified Assessor for executing the assessment at respective TC via online / offline mode.
- MSME NSQF Assessment Agency & respective TC Internal Assessment cell monitors the assessment process & records.

2. Testing Environment:

- MSME NSQF Assessment Agency confirms the Assessment location, date and time
- For number of candidates more than 30 separate assessors are assigned for the assessment.
- MSME NSQF Assessment Agency & respective assessor confirms that the allotted time to the candidates to complete Theory & Practical Assessment is correct.

3. Assessment Quality Assurance levels/Framework:

- Each TC Submits the Question Bank for the individual subject Theory & Practice separately, submits to MSME NSQF Assessment Agency and it is verified by the MSME NSQF Assessment Agency Committee members.
- Questions are mapped to the specified assessment criteria
- All the assessors & Trainers are well qualified & trained to carry out the specified task.

4. Types of evidence or evidence-gathering protocol:

- Online Link is send by MSME NSQF Assessment Agency to respective TC & Assessor. Reporting of the assessor from assessment location is verified by the MSME NSQF Assessment Agency through the online Meeting Link. Students are also required to join for the online link for verification by the MSME NSQF Assessment Agency.
- Assessment Photographs are shared with the MSME NSQF Assessment Agency & are also with the respective TC.

5. Method of verification or validation:

- Online Link is send by MSME NSQF Assessment Agency to respective TC & Assessor. Reporting of the assessor from assessment location is verified by the MSME NSQF Assessment Agency through the online Meeting Link. Students are also required to join for the online link for verification by the MSME NSQF Assessment Agency.

6. Method for assessment documentation, archiving, and access:

- The Assessment records are shared with MSME NSQF Assessment Agency & also stored at respective TC.

- Assessor fills the assessment report and shares with the MSME NSQF Assessment Agency.

On the Job Training:

- Each module will be assessed separately.
- The candidate must score 60% marks to successfully complete the OJT.
- Learner will be assessed on the basis of OJT report followed by Viva
- Assessment will ensure that the Learner is able to:
  - ✓ Effective engagement with the customers / Subordinates and team
  - ✓ Understand the working of various tools and equipment
  - ✓ Understand the working environment of the industry

Annexure VIII: 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
PDIM	Post Diploma in Mechatronics

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.
Short Term Training (STT)	STT/ Short -term skilling means any vocational training program undertaken for less than a year (Theory + Practical + OJT). https://ncvet.gov.in/sites/default/files/NCVET.pdf