QUALIFICATION FILE

Embedded Product Design - Technical Lead

☒ 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: 5.5

Submitted By:

Electronics Sector Skills Council of India (ESSCI)

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Section 1: Basic Details

1.	**Qualification Name**	**Embedded Product Design - Technical Lead**	
2.	**Sector/s**	**Electronics**	
3.	**Type of Qualification:** ☐ **New** ☒ **Revised** ☐ **Has Electives/Options** ☐**OEM**	**NQR Code & version of existing/previous qualification:** 2022/EHW/ESSC/05130 & V3.0	**Qualification Name of existing/previous version:** Embedded Product Design Engineer- Technical Lead
4.	**a. OEM Name** **b. Qualification Name** (*Wherever applicable*)	**N/A**	
5.	**National Qualification Register (NQR) Code &Version** (*Will be issued after NSQC approval*)	QG-5.5-EH-03983-2025-V4-ESSCI	**6. NCrF/NSQF Level:** 5.5
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 Embedded Product Design Engineer-Technical Lead designs, develops and debugs embedded systems and related products as per the given requirements, specifications, system architecture and feasibility analysis. The individual leads and performs the assigned responsibilities independently.	
9.	**Eligibility Criteria for Entry for Student/Trainee/Learner/Employee**	**a. Entry Qualification & Relevant Experience:**	

S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)
1	UG Degree (3 or 4 year Completed) in Physics/Electronics/Electrical/ Mechanical	1.5 years of relevant experience.
2	3 Year diploma after 10th in (Electronics/ Electrical/Mechanical)	3 Years of relevant experience.
3	Previous relevant Qualification of NSQF Level (5)	1.5 Years of relevant experience.
# Relevant Experience in Semiconductor & Components.		

b. Age: NA

10.	**Credits Assigned to this Qualification, Subject to Assessment** *(as per National Credit Framework (NCrF))*	20	**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** *(Specify **Total Duration** as per selected training delivery modes and as per requirement of the qualification)*	☐**Offline** ☐**Online** ☒**Blended** **Training Delivery Modes** / **Theory (Hours)** / **Practical (Hours)** / **OJT Mandatory (Hours)** / **OJT Recommended (Hours)** / **Total (Hours)** **Classroom (offline)** / 00:00 / 240:00 / 180:00 / 00:00 / 600:00 **Online** / 180.00 / 00:00 / 00:00 / 00:00 *(Refer Blended Learning Annexure for details)*
14.	**Aligned to NCO/ISCO Code/s** *(if no code is available mention the same)*	NCO-2015/2512.0501
15.	**Progression path after attaining the qualification** *(Please show Professional and Academic progression)*	Embedded Product Design Manager
16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Hindi
17.	**Is similar Qualification(s) available on NQR-if yes, justification for this qualification**	☐ **Yes** ☒ **No URLs of similar Qualifications: N/A**
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**	**No gender sensitization**
20.	**Are Greening/ Environment Sustainability Aspects Covered** *(Specify the NOS/Module which covers it)*	☒ **Yes** ☐ **No** **Employability Skills (DGT/VSQ/N0102)**
21.	**Is Qualification Suitable to be Offered in Schools/Colleges**	**Schools** ☐ **Yes** ☒ **No** **Colleges** ☒ **Yes** ☐ **No**
22.	**Name and Contact Details of Submitting / Awarding Body SPOC** *(In case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**Name:** Mr. Saleem Ahmed **Email:** ceo@essc-india.org **Contact No.:** 011 – 8447738501 **Website:** https://www.essc-india.org/
23.	**Final Approval Date by NSQC:** 07.05.2025	**24. Validity Duration:** 3 Years **25. Next Review Date:** 30.04.2028

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 to the 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.	Create Designs for Embedded Electronic product	ELE/N1432 & V1.0	Core	5.5	6	60	60	60	0	180	44	42	0	14	100	30
2.	Develop, Debug, and Verify Software for Embedded Products	ELE/N1433 & V1.0	Core	5.5	6	30	90	60	0	180	35	38	0	27	100	30
3.	Perform testing and rectify malfunctions in the prototype of the embedded product	ELE/N1434 & V1.0	Core	5.5	6	66	54	60	0	180	32	36	0	32	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					**20**	**180**	**240**	**180**	**0**	**600**	**131**	**146**	**0**	**73**	**350**	**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																

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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/ ITI/ Degree in Electronics/Electrical/Computer Science/Mechanical with 4 years of experience in Semiconductor, Components Manufacturing and preferably 1 years as Trainer in Electronics & Semiconductor Domain. Or Certified in relevant CITS Trade
2.	**Master Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	Diploma/ ITI/ Degree in Electronics/Electrical/Computer Science/Mechanical with 5 years of experience in Semiconductor, Components Manufacturing and preferably 2 years as Trainer in Electronics & Semiconductor Domain. 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/ ITI/ Degree in Electronics/Electrical/Computer Science/Mechanical with 5 years of experience in Semiconductor, Components Manufacturing and preferably 2 years as Trainer in Electronics & Semiconductor Domain. Or Certified in relevant CITS Trade
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Diploma/ ITI/ Degree in Electronics/Electrical/Computer Science/Mechanical with 6 years of experience in Semiconductor, Components Manufacturing and preferably 2 years as Trainer in Electronics & Semiconductor Domain. 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/ ITI/ Degree in Electronics/Electrical/Computer Science/Mechanical with 6 years of experience in Semiconductor, Components Manufacturing and preferably 2 years as Trainer in Electronics & Semiconductor Domain. 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:** 12
5.	**Estimated nos. of persons to be trained and employed:** 500
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**.	The Embedded Product Design - Technical Lead on the job is responsible for own work and learning functions require clear choice of procedures and well-developed skills to place.	5.5

	• Physical design flow for the specific system to receive the verified and validated net list after the synthesis process. • Follow the defined physical design flow/steps sequentially to develop the IC layout. • Perform floor planning which identifies the structures to be placed in the layout and partition the chip into small blocks. • Ensure that partition is done based on function/logic to enable easy placement and routing perform placement process after portioning. • Placement is done by considering clock tree synthesis process and any congestion, perform clock tree synthesis after placement, perform routing process to complete the physical design layout.	Hence Level 5.5	
Professional and Technical Skills/ Expertise/ Professional Knowledge	**Factual and theoretical knowledge in broad contexts within a field of work or study.** • basics of system on-chip (SOC) design, electronics engineering, system design modules • concepts of circuit design, • semiconductor physics, CMOS transistors, diodes, triodes, etc., computer architecture, • ASIC and FPGA circuit design, synthesis process and net list, physical design flow and their functions at each stage	The Embedded Product Design - Technical Lead on the job is responsible for the basic facts, process and principle applied in trade of employment in design reviews and rework the design to fix identified defects. Hence Level 5.5	5.5

	• usage of tools for different stages of physical design such as Design compiler, Calibre, Nano Route		
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.** • The job holder needs to understand the specifications and use of licensed software for design as specified by the organisation., • Licensed software and application tools used for design, their performance, usage. • Controls of tools used for physical design such as Design compiler, Calibre, Nano Route, programming language such as C and C++ • The job holder is required to demonstrate a range of cognitive and practical skills required to accomplish tasks and solve problems.	Recall and demonstrate a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information Hence Level 5.5	5.5
Broad Learning Outcomes/Core Skill	The job holder needs to know and understand how to read job sheets, flow charts and process documents, interpret design drawings, fill in design drawing sheets.	Language to communicate written or oral, with required clarity, skill to basic arithmetic and algebraic principles, basic understanding of social political and natural environment. Hence Level 5.5	5.5
Responsibility	The job holder must be able to Understand the work requirement, Understand the logic circuit design, develop physical design by following the design flow, Use software and tools for developing physical design, Coordinate with verification and testing engineer.	The job holder is Responsible for own work and learning and has some responsibility for others' works and learning Hence Level 5.5	5.5

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment
Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	PCB designing software/ spice	30	Nos
2	First aid kit	3	Nos
3	Fire extinguisher	1	No
4	Warning signs	1	Nos
5	Safety footwear	30	Pair
6	Rubber gloves	30	Pair
7	Head protection	30	Nos
8	Safety glasses	30	Nos
9	Power supply	2	Nos
10	Signal generators/analyzers	2	Nos
11	Frequency counters	2	Nos
12	Multimeters	6	Nos
13	JTAG	6	Nos
14	Microcontroller	30	Nos
15	Microprocessor	30	Nos
16	Oscilloscopes	1	Nos
17	PCB design software (Altium)	30	Nos
18	Circuit Simulator (Autodesk Eagle)	30	No
19	Cross compiler	30	Nos
20	Computer/Laptop with software	30	Nos

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	Balaji Private ITI	Rakesh Kumar	PRINCIPAL	Moonpur Mundawar Alwar Rajasthan	9829745313	rakeshiti@gamil.com	
6	EdgeFX Technologies Pvt. Ltd	Tarun Agarwal	COO	105, Liberty Plaza, Himayatnagar Hedrabad Telangana 500029		info@edgefxkits.in	
7	Rastriya Khushali Sansthan	Ramkaran Sinsinwar	President	VOP Tajsar Fatehpur Rajasthan	6350658040	Rkstajsar1998@gmail.com	
8	Manav Shiksha			Vill+Post – OlE, Dis. Mathura	7500000637		
9	Jnana Ganga Vidya Pith	Jagdish Parsad Yadav	Manager		9448467800	jagdishprasadyadav@gmail.com	

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10	Varujh Infotech Pvt. Ltd	Gaurav Prakash	M.D.	Kanpur Uttar Pradesh	8886634504	Skill.akyone@gmail.com	
11	Vedh Narayan Singh Sheva Sansthan	Manoj Kumar	Director	Dholpur Rajasthan	9216692269	Msharmadholpur1@gmail.com	
12	Vedham Academy Madurai	Sundar Rajan	Admin	Tamilnadu	9787551862		

Annexure: Training & Employment Details

Training and Employment Projections:

Year	Total Candidates	Women	People with Disability
	Estimated Training # Total	Estimated Training # Women	Estimated Training # PwD
2025-26	150	NA	NA
2026-27	150	NA	NA
2027-28	200	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	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2023-24	3	3	3	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2024-25	154	132	125	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
2.

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	Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
ELE/N1432: Create Designs for Embedded Electronic product	*Prepare and develop the design for embedded products*	**18**	**20**	**-**	**4**
	PC1. collect design requirements including IoT integration, cybersecurity considerations, and AI/ML capabilities, from authorize personnel	2	2		1
	PC2.finalize/list the software, hardware and firmware and cloud architecture required for modern embedded systems.	2	2		1
	PC3. Conduct feasibility analysis with emphasis on power optimization, edge computing, and scalability of the embedded product.	2	2		1
	PC4. interpret data sheets of components such as AI accelerators and edge processors, to assess operational characteristics	2	2		1
	PC5.Compare data of components with emerging technologies like RISC-V processors or ARM Cortex-M series for optimal performance.	2	2		
	PC6.Identify and use tools like MATLAB, TensorFlow Lite, and Zephyr OS for developing new product designs.	2	2		
	PC7. Collaborate with developers on requirements for AI/ML model integration and firmware optimization.	2	2		
	PC8. Ensure selected tools and hardware comply with industry standards for IoT and cybersecurity (e.g., ISO 27001).	2	2		
	PC9. confirm that licensed software (or open source) are used as per the company standards	1	2		

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	PC10. develop a work plan with agile methodology and DevOps practices for embedded product development.	1	2		
	PC11. prepare high-level and low-level design document including cloud integration and edge computing frameworks.				
	Use appropriate design techniques	**14**	**17**	**-**	**4**
	PC12. Apply model-based design techniques using tools like Simulink and LabVIEW for system simulation.	2	3		1
	PC13. confirm that new product design complies with relevant safety standards, performance and budget requirements	2	2		1
	PC14. check to confirm that prototype devices or circuits are built as per required specifications	2	2		1
	PC15. review codes received from the coder to ensure these are in line with the detailed design document requirements	2	2		1
	PC16. perform performance test on the prototype devices/ components as against product specifications and regulatory requirements	2	2		
	PC17. execute unit-test cases (UTCs) by advanced techniques like hardware-in-the-loop (HIL) testing.	2	3		
	PC18. report problems or issues to appropriate authority in accordance with relevant policy and procedure and seek guidance on how to resolve them	2	3		

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	Perform post design activities	**8**	**13**	**-**	**2**
	PC19. ensure configuration management of hardware items for embedded product	2	3		1
	PC20. create clear and concise hardware specifications, design documentation, hardware- related detailed design documentation, BOMs and parts lists, verification tests and reports	2	3		1
	PC21. review and evaluate supplier/vendor documentation against requirements	2	4		
	PC22. provide courses of action to management for procurement of all hardware-related components and related services	2	3		
	NOS Total	**40**	**50**	**-**	**10**
ELE/N1433: Develop, Debug, and Verify Software for Embedded Products	*Prepare for embedded product software development based on design documents*	**15**	**20**	**-**	**4**
	PC1. supervise code development work and ensure it is as per high-level design and low-level design, job requirement specifications and in consultations with relevant persons:	2	2		1
	PC2. manage activities to meet scheduled timelines in consultation with others involved in the work	2	2		1
	PC3. verify that the appropriate development kit and software based on specified requirements and performance standard	2	2		1
	PC4. plan how to carry out programming efficiently including development of the software solution, its purpose, potential challenges, how to deal with the challenges, which architecture is being used, etc.	2	2		1
	PC5. verify that the appropriate microprocessor or microcontroller for a given task and optimize the embedded design using basic input/ output functions	1	2		

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	PC6. test the setup by compiling and running to check errors in the programs	1	2		
	PC7. monitor the proposed features and operation of the embedded product e.g. memory organization, peripheral operation, timers, data ports, etc.) and interrupt operation, etc.	1	2		
	PC8. verify the software requirements specifications for functionality, performance and other considerations	1	2		
	PC9. ensure correct structure and syntax for developing program specification for target microcontroller function is followed by the coding/development team	1	2		
	PC10. review the requirements document by using the basis for writing the test plan	1	1		
	PC11. verify an appropriate embedded product development board and compiler/ development environment for the microcontroller/ processor to be programmed on the development board	1	1		
	Develop software solutions for embedded products	**15**	**16**	**-**	**3**
	PC12. observe code using timers, data communication ports, analog-to-digital and digital-to- analog converters, and any other embedded product peripherals	2	2		1
	PC13. verify an existing microprocessor/microcontroller software program to comply with specified function and operating parameters	2	2		1
	PC14. manage field programmable gate arrays and digital signal processors as per design requirement	2	2		1
	PC15. review applications that perform signal processing, data acquisition, event processing, data management, and communication functions as per requirements	2	2		
	PC16. observe system using real-time embedded operating systems (VxWorks, QNX, etc.)	2	2		
	PC17. Verify that correct syntax and appropriate unit test cases (UTCs) have been used when developing code	1	2		

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	PC18. review codes, UTCs, document results with appropriate people	1	1		
	PC19. monitor the code and UTCs to fix identified defects	1	1		
	PC20. review feedback from appropriate people to inform future designs	1	1		
	PC21. verify correct action for identified defects to inform future designs and test code for approval by appropriate personnel	1	1		
	Test the software solutions for embedded products	**10**	**14**	**-**	**3**
	PC22. ensure testing procedures to analyze code	2	2		1
	PC23. manage key features of the programming language used to develop and test solutions key features to use of registers, addressing modes, assembler instructions, subroutines and flags, etc.	2	3		1
	PC24. check embedded code to determine root cause of defects and implement corrective action	2	3		1
	PC25. verify problems and bugs in code by applying debugging techniques to ensure specifications are met	2	2		
	PC26. test the compiled code and embedded product into the memory of the embedded product to see if it is working	2	2		
	PC27. verify the program execution using assembler/simulator software packages	2	2		
	NOS Total	**40**	**50**	**-**	**10**
ELE/N1434: Perform testing and rectify malfunctions in the prototype of the embedded product	*Test the prototype of the embedded product*	**15**	**24**	**-**	**3**
	PC1. verify the constructed prototype devices/components using appropriate software, hardware and testing methods	5	8		1
	PC2. test the prototype devices/ components using approved procedures that operational requirements are met	5	8		1

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	PC3. test unit failures and develop corrective actions to identify the problem in coordination with work with the test/ QA team	5	8		1
	Rectify malfunction, if any, in the prototype	**25**	**26**	**-**	**4**
	PC4. review and debug the constructed prototype devices/components using appropriate software, hardware	5	6		1
	PC5. check compliance with quality standards to provide correct techniques to rectify malfunctions as per standard operating procedures	5	5		1
	PC6. review component change notifications and sourcing alternate components	5	5		1
	PC7. guide the completed new product design work appropriately and submit to relevant authority/ person for approval	5	5		1
	PC8. verify rectification and ensure product is fine	5	5		
	NOS Total	**40**	**50**	**-**	**10**
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**	**-**	**-**

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	PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
	PC6. practice the 21st Century Skills such as Self- Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
	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**	**-**	**-**
	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	-	-	-	-

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	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	-	-	-	-
	NOS Total	**20**	**30**	**-**	**-**
Grand Total		**131**	**146**		**73**

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

2. Testing Environment:

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

3. Assessment Quality Assurance levels/Framework:

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

4. Types of evidence or evidence-gathering protocol:

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

5. Method of verification or validation:

- Surprise visit to the assessment location

6. Method for assessment documentation, archiving, and access

- Hard copies of the documents are stored

On the Job:

1. Each module (which covers the job profile of Embedded Product Design - Technical Lead) 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
    - 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:

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- To prepare and understand the development and designing for embedded products
- To understand practical part of develop and test software solution of embedded product
- Test and rectify malfunctions in the prototype of the embedded product
- Work effectively at workplace.

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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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