

QUALIFICATION FILE

IoT Hardware Analyst

☒ 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:

Electronics Sector Skills Council of India (ESSCI)

155, 2nd Floor, ESC House

Okhla Industrial Area - Phase 3,

New Delhi – 110020

Tel: 011 – 8447738501

Table of Contents

Section 2: Module Summary	5
NOS/s of Qualifications	5
Mandatory NOS/s:.....	5
Elective NOS/s:.....	6
Optional NOS/s:.....	6
Assessment - Minimum Qualifying Percentage.....	6
Section 3: Training Related	6
Section 4: Assessment Related	7
Section 5: Evidence of the need for the Qualification.....	8
Section 6: Annexure & Supporting Documents Check List	8
Annexure: Evidence of Level.....	9
Annexure: Tools and Equipment (Lab Set-Up).....	11
Annexure: Industry Validations Summary	13
Annexure: Training Details	15
Annexure: Detailed Assessment Criteria.....	17
Annexure: Assessment Strategy	23
Annexure: Acronym and Glossary	25

Section 1: Basic Details

1.	Qualification Name	IoT Hardware Analyst														
2.	Sector/s	Electronics														
3.	Type of Qualification: ☐ New ☒ Revised ☐ Has Electives/Options ☐ OEM	NQR Code & version of existing/previous qualification: (change to previous, once approved)- QG-05-EH-00424-2023-V1.1-ESSC & V3.0		Qualification Name of existing/previous version: IoT Hardware Analyst												
4.	a. OEM Name b. Qualification Name (Wherever applicable)	NA														
5.	National Qualification Register (NQR) Code & Version (Will be issued after NSQC approval)	QG-05-EH-03971-2025-V4-ESSCI	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 individual in this job role prepares a complete blueprint of the hardware including schematics layout, quality verification requirements and performs PCB testing in compliance with regulatory standards to record them in a design document. The individual will also be responsible for working and efficient functioning of the system.														
9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: <table border="1"> <thead> <tr> <th>S. No.</th> <th>Academic/Skill Qualification (with Specialization - if applicable)</th> <th>Required Experience (with Specialization - if applicable)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UG Diploma in the relevant field (Physics/Electronics/ Electrical/Computer Science)</td> <td>1.5 years of relevant experience required.</td> </tr> <tr> <td>2</td> <td>3 Years Diploma after 10th (Electronics/Electrical/ Computer Science)</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> </tbody> </table> # Relevant experience in the Electronics domain.			S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1	UG Diploma in the relevant field (Physics/Electronics/ Electrical/Computer Science)	1.5 years of relevant experience required.	2	3 Years Diploma after 10 th (Electronics/Electrical/ Computer Science)	3 years of relevant experience.	3	Previous relevant qualification of NSQF level 4.5	1.5 years of relevant experience.
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)														
1	UG Diploma in the relevant field (Physics/Electronics/ Electrical/Computer Science)	1.5 years of relevant experience required.														
2	3 Years Diploma after 10 th (Electronics/Electrical/ Computer Science)	3 years of relevant experience.														
3	Previous relevant qualification of NSQF level 4.5	1.5 years of relevant experience.														
		b. Age: NA														
10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	15	11. Common Cost Norm Category (I/II/III) (wherever applicable): I													

12.	Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)	NA																						
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 <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>Classroom (offline)</td> <td>00:00</td> <td>180:00</td> <td>150:00</td> <td>00:00</td> <td rowspan="2">450</td> </tr> <tr> <td>Online</td> <td>120:00</td> <td>00:00</td> <td>00:00</td> <td>00:00</td> </tr> </tbody> </table> (Refer Blended Learning Annexure for details)						Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)	Classroom (offline)	00:00	180:00	150:00	00:00	450	Online	120:00	00:00	00:00	00:00
Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)																			
Classroom (offline)	00:00	180:00	150:00	00:00	450																			
Online	120:00	00:00	00:00	00:00																				
14.	Aligned to NCO/ISCO Codes (if no code is available mention the same)	NCO-2015/2152.0801																						
15.	Progression path after attaining the qualification (Please show Professional and Academic progression)	Lead – IoT Hardware																						
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:																						
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: 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	Prepare detailed requirements and design specification documents	ELE/N1424 & V1.0	Core	5	5	36	54	60	0	150	40	50	-	10	100	30
2	Develop the circuit schematic and PCB layout for the IoT system	ELE/N1425 & V 1.0	Core	5	4	30	60	30	0	120	40	50	-	10	100	30
3	Assemble and perform testing of the complete IoT solution	ELE/N1426 & V1.0	Core	5	4	30	30	60	0	120	40	50	-	10	100	20
4	Employability Skills (60 Hours)	DGT/VSQ/N0102 & V 1.0	Non-Core	4	2	24	36	0	0	60	20	30	0	0	50	20
Duration (in Hours) / Total Marks					15	120	180	150	0	450	140	180		30	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																

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 (Electrical/ Mechanical/ Electronics) with 2 years industrial and 1 year training experience in the field of Semiconductor, Component Manufacturing. 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 (Electrical/ Mechanical/ Electronics) with 3 years industrial and 1 years training experience in the field of Semiconductor, Component Manufacturing. 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 (Electrical/ Mechanical/ Electronics) with 3 years industrial and 1 years assessment experience in the field of Semiconductor, Component Manufacturing. Or Certified in relevant CITS Trade
2.	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Diploma/ITI (Electrical/ Mechanical/ Electronics) with 4 years industrial and 1 years assessment experience in the field of Semiconductor, Component Manufacturing. 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 (Electrical/ Mechanical/ Electronics) with 4 years industrial and 1 years assessment experience in the field of Semiconductor, Component Manufacturing. 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: 4000
6.	Evidence of Concurrence/Consultation with Line Ministry/State Departments: In process 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 broad range of activity involving standard and non-standard practices. •Requires well developed technical capability to understand the Design process and Work flow involved in each stage of design. •Requires capability to plan activity based on work-flow and deliverables. Capability to understand the Business and resulting Software Requirement Specification (SRS) for the project. •Develop the interface and functional requirements for the embedded software from System SRS. •Knowledge of Language, Libraries and architecture of device and should have experience of coding, developing test cases, testing, debugging the developed module as per SRS. •Understand the software module requirement for the embedded system and constraints and finally understand circuit design, functionality, and logic involved in the system. •Design the software using language and application as per standard and get approval for design approach from superior design team.	IoT Hardware Analyst individual on the job is responsible for own work and learning functions require clear choice of procedures and well- developed skills to place Hence Level 5	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Principles and process for in the field of Electronics Design Programmable Devices, • Software Design, System design using Embedded Software and constraints. • To understand the software module requirement for the embedded system • Should understand circuit design, functionality, logic involved in the system and be aware of the software development process.	IoT Hardware Analyst on the job is responsible for the basic facts, process and principle applied in trade of employment in verification reviews and rework the design to fix identified defects. Hence Level 5	5

	• Should have knowledge of Development Tools, Test Tools, to develop the coding, • testing, debugging requirements from the SRS. • Access reusable components, code generation tools and unit testing tools from the company's database. • Develop software modules to meet the requirement specification, develop unit test cases (UTC) as per specification and requirement. • Conduct test to ensure that the software module meets the requirement specification. • Assist in code reviews and rework the code to fix identified defects.		
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Capability to understand Electronics, Software design process and understanding of the general design flow and activities involved in each stage of design. • Planning capability to plan activity based on workflow and deliverables. • Develop the coding, testing, debugging requirements from the SRS. • Understand the software module requirement for the embedded system and constraints and finally understand circuit design, functionality, logic involved in the system. • Access reusable components, code generation tools and unit testing tools from the company's database. • Develop software modules to meet the requirement specification, develop unit test cases (UTC) as per specification and requirement.	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

	Conduct test to ensure that the software module meets the requirement specification. Assist in code reviews and rework the code to fix identified defects.		
Broad Learning Outcomes/Core Skill	Requires knowledge of language, good communication skills and documentation skill for Interacting with superior briefing them on status of work completion and pending targets. Requires Planning capability to plan activity based on work-flow and deliverables in consultation with the lead engineer. To interact with project lead and design lead to understand the project specific embedded system mandate. Develop software design using standard language and application and get approval for design approach from superior design team. Maintain good peer group relation and capability of learning from their technical and behavioural experiences.	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
Responsibility	In his routine activities of understanding System Design, Requirements of Embedded, Developing Software, Developing Test suites, interfacing with other system modules, interfacing with co-designers and systems he is not under any kind of supervision and is completing tasks on his own. With each step ahead and problem-solving exercise he is adding to his own learning.	The job holder is Responsible for own work and learning and has some responsibility for others' works and learning 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	Chairs/Tables	No.	30
2	Latest configuration computer with internet	No.	7
3	LCD projector with screen	No.	1
4	Trainer chair and Table	No.	1
5	Demonstration table pin up boards	No.	1

6	White board with marker	No.	1
7	Connecting screwdriver	No.	10
8	Neon tester 500 V.	No.	6
9	Screw driver set	No.	10
10	Insulated combination pliers	No.	6
11	Insulated side cutting pliers	No.	8
12	Long nose pliers	No.	6
13	Soldering iron	No.	10
14	Electrician knife	No.	6
15	Tweezers	No.	10
16	Digital Multimeter	No.	10
17	Soldering Iron Changeable bits	No.	6
18	Tweezers – Bend tip	No.	2
19	Crimping tool (pliers)	No.	4
20	File set	No.	4
21	Allen key set (Hexagonal -set of 9)	No.	1
22	Multiple Output DC regulated power supply	No.	4
23	DC Regulated Variable Programmable DC Power Supply	No.	2
24	LCR meter (Digital) Handheld	No.	1
25	Analyzer	No.	1
26	Digital IC Trainer	No.	1
27	IT Workbench for computer hardware and networking	No.	1
28	Electronic circuit simulation software	Nos	5
29	Different types of electronic and electrical cables, connectors, sockets, terminations	No.	10
30	Different types of Analog electronic components, digital ICs, power electronic components, general purpose PCBs	No.	10
31	SMD Soldering & De soldering Station with necessary accessories	No.	1
32	SMD Technology Kit	No.	1
33	Microcontroller kits (8051) along with programming software	No.	1
34	Sensor Trainer Kit Containing required Sensors	No.	2
35	Internet of Things Explorer	No.	1
36	Wireless Communication modules for interfacing with microcontrollers	No.	1

Classroom Aids

The aids required to conduct sessions in the classroom are:

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

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	Sri Venkateswara College of Engineering	Dr C Chandrasekhar	Head R &D & Professor in ECE	Karakmbadi Road,Tirupati 517507	9177217190	dr.chandrasekhar.c@svcolleges.edu.in	
8	GS TECHNO Innovations Pvt. Ltd.	Prakash Sharma	CEO	D-15/1, Ground Floor, Gurgaon		ceogstechno@gmail.com	

9	Rastriya Khushali Sansthan	Ramkaran Sinsinwar	President	VOP Tajsar Fatehpur Rajasthan	6350658040	Rkstajsar1998@gmail.com	
10	ApexIIT (OPC) Private Limited	Amit	Director	461, Phase V, Udyog Vihar Gurgaon 122016 Haryana India	9784868951	info@apex.com	
11	Nexgen Exhibitions Pvt. Ltd.	Saurabh Purwar	Director	1201/1206 Pragati Tower, 26 Rajendra Place, New Delhi-110008, India	9457306691	fbvidgo@gmail.com	
12	Manav Shiksha			Vill+Post – OIE, Dis. Mathura	7500000637		
13	Annur Indutrial Training Institute	Shridevikr	Director		9489675146	skill@gmail.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	Jnana Ganga Vidya Pith	Jagdish Parsad Yadav	Manager		9448467800	jagdishprasadyadav@gmail.com	
16	Johnson Control India	Dr. Ashish	Sr. Manager		9923200958	Ashishkardam958@gmail.com	
17	Yuvashakti Foundation(YSF)	Motiram Pawar	Director		9922426404	ysfskills@gmail.com	
18	Varujh Infotech Pvt. Ltd	Gaurav Prakash	M.D.	Kanpur Uttar Pradesh	8886634504	Skill.akyone@gmail.com	
19	Vedh Narayan Singh Sheva Sansthan	Manoj Kumar	Director	Dholpur Rajasthan	9216692269	Msharmadholpur1@gmail.com	
20	Vedham Academy Madurai	Sundar Rajan	Admin	Tamilnadu	9787551862		
21	Yuvashakti Foundation(YSF)	Motiram Pawar	Director		9922426404	ysfskills@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	1000	NA	NA
2026-27	1000	NA	NA
2027-28	2000	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	6	6	6	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2023-24	17	17	16	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2024-25	2384	1657	1525	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:

1. English

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 Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
ELE/N1424 – Prepare detailed requirements and design specification documents	<i>Prepare documents highlighting the requirements and system specifications</i>	22	26	-	5
	PC1. verify the high-level design and connectivity requirements using modern IoT frameworks and advanced simulation tools.	2	4		1
	PC2. ensure that the need and requirement for inter- operability between various connectivity interfaces is maintained	2	2		1
	PC3. list the protocols that facilitate the handshakes between different connected devices in the IoT system	2	2		1
	PC4. Develop detailed flowcharts and connected diagrams using advanced tools (e.g., Lucid chart, Visio) to represent machine-to-machine (M2M) communication and data flows.	2	2		1
	PC5. Manage the manufacturing processes involved and the integration requirements of the system to ensure all equipment needed for validation and testing the system is available	2	2		1
	PC6. Use dependency management tools to identify critical stages and mitigate process constraints.	2	2		
	PC7. Highlight and automate trigger mechanisms for each system component using IoT middleware platforms.	2	2		
	PC8. Incorporate cybersecurity measures and data encryption protocols in all design stages to enhance safety and security.	2	2		
	PC9. ensure that globally accepted regulatory standards for the technical specifications have been considered while listing specifications and system requirements	2	2		
	PC10. Supervise the finalization of requirements and specifications along with other determinants required for proper design and development such as parameters to be recorded, specific connectivity need at each interface, etc.	2	2		
	PC11. Collaborate with stakeholders to confirm safety requirements and obtain formal approval for requirement specifications.	2	4		
	<i>Create a detailed design document</i>	18	24	-	5
	PC12. Review functional specifications using digital collaboration platforms for	2	2		1

	real-time feedback and updates.				
	PC13. ensure that an alternative design analysis has been prepared which describes all possible options/solutions for the requirements specifications	2	2		1
	PC14. verify that the IoT system matches the technical specifications and confirms with the evaluation criteria and appropriate components to be deployed	2	2		1
	PC15. ensure that reusable components, relevant best practices and design standards have been used and followed as per the organization's knowledge base	2	2		1
	PC16. prepare for the component and human resources requirements from various domains such as chip design (if any), board design, layout designers, connectivity protocol experts, firm ware designers, verification and validation folks, etc.	2	2		1
	PC17. Utilize advanced simulation and synthesis tools (e.g., MATLAB, Cadence) for analyzing electronic circuit designs.	2	2		
	PC18. Validate that the designed system meets current quality standards and user expectations, including predictive maintenance and self-healing capabilities.	2	2		
	PC19. review strategies used by the designed system for energy efficiency, environmental standards and safety measures	1	2		
	PC20. check noise and electromagnetic interface (EMI) and electromagnetic compatibility (EMC) requirements in electrical and electronic systems	1	4		
	PC21. Guide initial assessment of the entire system while outlining the possible delivery output with the client and seek their approval	2	4		
	Total Marks	40	50	-	10
ELE/N1425– Develop the circuit schematic and PCB layout for the IoT system.	<i>Develop a design for the hardware system</i>	9	10	-	3
	PC1. verify prescribed safety guidelines and check microcontroller(or microprocessor) with the desired Read Only Memory (ROM) and frequency to meet the processing requirements of the application	3	4		1
	PC2. check that the pin configurations for all components based on input and output requirements have been met	3	4		1
	PC3. review the right connectivity modules and other components as per requirement specifications	3	2		1
	<i>Build a prototype</i>	15	17	-	4

	PC4. Test voltage levels and integrate advanced power management ICs to ensure stable power delivery.	2	3		1
	PC5. check all connectivity interfaces required between the components of the system, both wired and wireless (short range and long range)	2	3		1
	PC6. verify that each component functions as per the design requirements for the system	2	3		1
	PC7. Use agile project management tools to allocate resources and track progress effectively.	2	3		1
	PC8. Monitor component selection and connectivity methods to balance technical and cost requirements.	4	3		
	PC9. Perform advanced simulations, including thermal analysis and noise reduction, to optimize system performance.	3	2		
	<i>Test the functionality and usability of the prototype</i>	16	23	-	3
	PC10. Monitor component interactions using IoT analytics platforms and ensure proper triggering of events.	2	3		1
	PC11. Validate programming languages and firmware (e.g., Python, Embedded C) for optimized device communication.	2	3		1
	PC12. verify the prototype and perform a pilot run of the entire system in the simulated client environment	2	3		1
	PC13. guide alternate solutions based on optimization techniques and perform minor revisions through what-if scenarios and document the pros and cons	2	2		
	PC14. Ensure compliance with updated regulatory, safety, and environmental standards for manufacturing PCBs and chips.	2	3		
	PC15. test one prototype solution (or may be two) and prepare detailed notes of the specifications (dimensions, functional, constraints)	2	3		
	PC16: Prepare a comprehensive Bill of Materials (BOM) and ensure alignment with client requirements.	2	3		
	PC17: Use advanced PCB design tools to define stack-ups, placement, routing, and impedance matching requirements.	2	3		
	Total Marks	40	50	-	10
	<i>Build the IoT system</i>	12	15	-	3

ELE/N1426 – Assemble and perform testing of the complete IoT solution	PC1. verify that the appropriate manufacturing technology is used to build the system (PCBs and the ICs) for required components as well as their functionality	4	5		1
	PC2: Document probing points for components using updated design tools for better traceability.	4	5		1
	PC3: Test PCBs using modern test equipment like logic analyzers, spectrum analyzers, and IoT-specific debugging tools.	4	5		1
	<i>Configure and test the system</i>	15	19	-	4
	PC4: Validate input-output points using IoT testing frameworks and ensure proper triggering of desired events.	4	5		1
	PC5: Perform automated system testing using DevOps pipelines and document test results comprehensively.	4	5		1
	PC6: Troubleshoot system anomalies using AI-powered diagnostic tools and resolve design defects.	4	5		1
	PC7: Test the system for various applications, leveraging cloud-based IoT platforms for scalability and performance analysis.	3	4		1
	<i>Validate the system correctness against specifications</i>	13	16		3
	PC8. observe and interpret test results against specifications and check for compliance against the specifications	3	4		1
	PC9: Perform RF tuning and analysis using advanced tools for boards with RF interfaces, ensuring optimal performance.	3	4		1
	PC10: Conduct root cause analysis with predictive analytics to resolve discrepancies between test results and specifications.	3	4		1
	PC11: Document changes in specifications or design and finalize the IoT system using updated quality assurance processes.	4	4		
	Total Marks	40	50	-	10
DGT/VSQ/N0102 - Employability Skills (60 hours)	<i>Introduction to Employability Skills</i>	1	1	-	-
	PC1. identify employability skills required for jobs in various industries				
	PC2. identify and explore learning and employability portals				
	<i>Constitutional values – Citizenship</i>	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				
	<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
	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				
	<i>Basic English Skills</i>	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				
	<i>Career Development & Goal Setting</i>	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				
	<i>Communication Skills</i>	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	-	-	-	-
	<i>Diversity & Inclusion</i>	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				
	<i>Financial and Legal Literacy</i>	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				
	<i>Essential Digital Skills</i>	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				
	<i>Entrepreneurship</i>	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				
	<i>Customer Service</i>	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				
	<i>Getting ready for apprenticeship & Jobs</i>	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		140	180	-	30

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 center 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

- 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 IoT Hardware Analyst) 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 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:
 - Understand the theoretical concept of IoT
 - Understand practical aspect of IoT system
 - Perform designing circuit and PCB layout
 - Work effectively at the workplace

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