

QUALIFICATION FILE

HVAC (Heating, Ventilation, and Air Conditioning) Technician

☒ 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: 4

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 1: Basic Details	3
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)	10
Annexure: Industry Validations Summary	12
Annexure: Training Details	15
Annexure: Blended Learning	16
Annexure: Detailed Assessment Criteria	17
Annexure: Assessment Strategy	23
Annexure: Acronym and Glossary	25

Section 1: Basic Details

1.	Qualification Name	HVAC * Technician *Heating, Ventilation, and Air Conditioning																
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 2022/EHW/ESSC/06634 & V 3	Qualification Name of existing/previous version: HVAC Technician															
4.	a. OEM Name b. Qualification Name (Wherever applicable)	NA																
5.	National Qualification Register (NQR) Code & Version (Will be issued after NSQC approval)	QG-04-EH-044992025-V2-ESSCI	6. NCrf/NSQF Level: 4															
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 maintains and repairs heating, air conditioning and ventilation systems in commercial and industrial areas. The individual engages with the client to understand the work requirement and follows organizational norms to complete the work.																
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>12th grade or equivalent</td> <td>NA</td> </tr> <tr> <td>2</td> <td>10th grade or equivalent</td> <td>3 years relevant experience</td> </tr> <tr> <td>3</td> <td>Certificate-NSQF (Level-3 in relevant domain)</td> <td>3 years of relevant experience</td> </tr> <tr> <td colspan="3"># Relevant Experience in Consumer Electronics & IT Hardware</td> </tr> </tbody> </table> b. Age: NA		S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1	12th grade or equivalent	NA	2	10th grade or equivalent	3 years relevant experience	3	Certificate-NSQF (Level-3 in relevant domain)	3 years of relevant experience	# Relevant Experience in Consumer Electronics & IT Hardware		
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)																
1	12th grade or equivalent	NA																
2	10th grade or equivalent	3 years relevant experience																
3	Certificate-NSQF (Level-3 in relevant domain)	3 years of relevant experience																
# Relevant Experience in Consumer Electronics & IT Hardware																		
10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrf))	17	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 (<i>Specify Total Duration as per selected training delivery modes and as per requirement of the qualification</i>)	☐ Offline ☐ Online ☒ Blended <table border="1" data-bbox="1025 148 2123 419"> <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">510</td> </tr> <tr> <td>Online</td> <td>180:00</td> <td>00:00</td> <td>00:00</td> <td>00:00</td> </tr> </tbody> </table> <i>(Refer Blended Learning Annexure for details)</i>					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	510	Online	180:00	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	510																		
Online	180:00	00:00	00:00	00:00																			
14.	Aligned to NCO/ISCO Code/s (<i>if no code is available mention the same</i>)	NCO-2015/3115.1100																					
15.	Progression path after attaining the qualification (<i>Please show Professional and Academic progression</i>)	HVAC Supervisor																					
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 (<i>Specify the NOS/Module which covers it</i>)	☒ Yes ☐ No (Employability Skills (30 hours))																					
21.	Is Qualification Suitable to be Offered in Schools/Colleges	Schools ☐ Yes ☒ No Colleges ☒ Yes ☐ No																					
22.	Name and Contact Details of Submitting / Awarding Body SPOC <i>(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</i>	Name: Saleem Ahmed Email: ceo@essc-india.org Contact No.: 011 – 8447738501 Website: https://www.essc-india.org/																					
23.	Final Approval Date by NSQC: 07.10.2025	24. Validity Duration: 3 Years			25. Next Review Date: 07.10.2028																		

Section 2: Module Summary

NOS/s of Qualifications

(In exceptional cases these could be described as components)

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

Th.-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended **Proj.**-Project

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	Engage with customer for service of HVAC system	ELE/N3192 & V1.0	Core	4	4	60	30	30	0	120	40	50	0	10	100	20
2	Service, troubleshoot and repair a HVAC system (chillers)	ELE/N3140 & V3.0	Core	4	5	30	60	60	0	150	40	50	0	10	100	30
3	Service, troubleshoot and repair a packaged type HVAC ducted system	ELE/N3141	Core	4	7	60	90	60	0	210	40	60	0	0	100	30
4	Employability Skills (30 hours)	DGT/VSQ/N010 1 & V1.0	Non-core	4	1	30	0	0	0	30	20	30	0	0	50	20
Duration (in Hours) / Total Marks					17	180	180	150	0	510	140	190	0	20	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 (Electronics/Electrical/Mechanical) with 1 years industrial and 1 year training experience in the field HVAC Technician.
----	---	---

		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 (Electronics/Electrical/Mechanical) with 2 years industrial and 1 year training experience in the field HVAC Technician. 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 (Electronics/Electrical/Mechanical) with 2 years industrial and 1 year training experience in the field HVAC Technician. Or Certified in relevant CITS Trade
2.	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Diploma/ ITI (Electronics/Electrical/Mechanical) with 3 years industrial and 2 year training experience in the field HVAC Technician. 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 (Electronics/Electrical/Mechanical) with 4 years industrial and 3 year training experience in the field HVAC Technician. 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: 25
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 <i>(Mandatory)</i>	<i>Attached</i>
2.	Annexure: List of tools and equipment relevant for qualification <i>(Mandatory, except in case of online course)</i>	<i>Attached</i>
3.	Annexure: Detailed Assessment Criteria <i>(Mandatory)</i>	<i>Attached</i>
4.	Annexure: Assessment Strategy <i>(Mandatory)</i>	<i>Attached</i>
5.	Annexure: Blended Learning <i>(Mandatory, in case selected Mode of delivery is “Blended Learning”)</i>	<i>Filled</i>
6.	Annexure: Multiple Entry-Exit Details <i>(Mandatory, in case qualification has multiple Entry-Exit)</i>	<i>Filled</i>
7.	Annexure: Acronym and Glossary <i>(Optional)</i>	<i>Attached</i>
8.	Supporting Document: Model Curriculum <i>(Mandatory – Public view)</i>	<i>Attached</i>
9.	Supporting Document: Career Progression <i>(Mandatory - Public view)</i>	<i>Attached</i>
10.	Supporting Document: Occupational Map <i>(Mandatory)</i>	<i>Attached</i>

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 specialized technical skill, clarity of knowledge and practice in broad range of activity involving standard and non-standard practices. • Perform the repairing processes. • Follow all guidelines and instructions. • Adhere to industry work practices to achieve productivity and quality standards. • Check the working of the appliances.	A HVAC (Heating, Ventilation, and Air Conditioning) Technician is responsible for installing the appliances, finding the faults and repairing the same of the various appliances as per instructions and standard operating procedures. Hence Level 4	4
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Knowledge of various materials, repairing processes, working of various home appliances. • Know the instructions and guidelines to achieve productivity and quality standards	A HVAC (Heating, Ventilation, and Air Conditioning) Technician should know the different processes involved in finding the faults and repairing of various home appliances, their working and the guidelines to achieve productivity and quality standards. Hence Level 4	4
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Communicate with customer, team and supervisor to understand the work requirement • Identify the errors in orders • Maintain inventory • Complete the documentation of maintenance and service records	A HVAC (Heating, Ventilation, and Air Conditioning) Technician should be able to use basic tools in correct way to repair the faults in the appliances. He/she works after getting work requirements from supervisor or other team members. Hence Level 4	4

Broad Learning Outcomes/Core Skill	• Assembly procedures • Working of various home appliances • Guidelines and instructions for repairing	A HVAC (Heating, Ventilation, and Air Conditioning) Technician needs to know the repairing procedures, working of various home appliances. The technician should keep the workplace clean and managed. Hence Level 4	4
Responsibility	• Understand the job role and follow the organizational policy • Record and report about the work status • Follow safety regulations at work place	A HVAC (Heating, Ventilation, and Air Conditioning) Technician should record the issues and report about the same to supervisor and also update the status of the work as per organizations policy. Hence Level 4	4

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Quantity for specified	Specifications
1	Philips screw driver	30	Standard
2	Flat screw driver	30	Standard
3	plier set	30	Standard
4	Butane cane	30	Standard
5	Lighter	30	Standard
6	spanner set	30	Standard
7	Clamp meter	30	Standard
8	anemometer	30	Standard
9	pressure gauges	30	Standard
10	Flaring tool set	30	Standard
11	Allen key set	30	Standard
12	Adjustable wrench set	30	Standard
13	Vacuum pump 2- stage	6	Standard
14	AC system service pump	6	Standard
15	Reamer	30	Standard

16	Mechanical bender 1/4"	30	Standard
17	Mechanical bender 3/8"	30	Standard
18	Mechanical bender 1/2"	30	Standard
19	Mechanical bender 5/8"	30	Standard
20	Spring Bender 1/4"	30	Standard
21	Spring Bender 3/8"	30	Standard
22	Spring Bender 1/2"	30	Standard
23	Fin Comb	30	Standard
24	Air blower	6	Standard
25	Claw Hammer	30	Standard
26	Psychometric charts	30	Standard
27	Dx chiller package,	3	Standard
28	cooling tower,	3	Standard
29	AHU,	3	Standard
30	FCU,	3	Standard
31	duct work,	3	Standard
32	water pipes and motors,	3	Standard
33	electrical panels	3	Standard
34	Logbooks, maintenance and service documents	30	Standard
35	Safety shoes,	31	Standard
36	gloves,	31	Standard
37	mask,	31	Standard
38	helmet,	31	Standard
39	goggles	31	Standard
40	HVAC system specification document,	30	Standard
41	Warranty and service details	30	Standard
42	Fire extinguishers,	3	Standard
43	sand bucket,	3	Standard
44	fire exit plans	1	Standard

45	Organisation policy and standard documents	30	Standard
46	Packaged type HVAC system,	3	Standard
47	Duct system,	3	Standard
48	refrigerant gas filling apparatus	6	Standard
49	Digital Weighing scale	6	Standard
50	Refrigerants different types	10	Standard

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

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	Access Edutech Pvt. Ltd.	Sanjay Kumar Mishra	Director	96, Vrindavan Nagar Ayodhya Bypass Road Bhopal	7000650224	sanjaymishra@accesse dutech.com	
2	Artificial Intelligence Technologies	Rohit Kumar Sharma	Manager – Product Development	A-21, sector 4, Block A, Kailash Colony, Greater Kailash, New Delhi	9927564461	rohit.sharma@aitunive rsal.com	
3	Bergen Associates Pvt Ltd.	Soubam Sunil	Manager	305-306, Magnum House-I, Commercial Complex,	9311780832	s.soubam@bergengrou pindia.com	

				Karampura, New Delhi – 110015			
4	Conduent- https://www.conduent.com	Prince Jain	Senior Business Analyst	7 to 9th Floor & 6 to 9th Floor, Building No.5 & 6, Plot No 20&21, Candor Tech Space, IT/ITES SEZ., Noida, Uttar Pradesh 201304	8439385780	prince.jain@conduent.com	
5	Ephicity Lifescience Analytics	Rahul Kumar Kaushik	Senior Software Engineer	2nd Main Rd, Sarvobhogam Nagar, Arekere, Bengaluru, Karnataka 560076	8859885973	Rahul.Kaushik@ephicity.com	
6	IIAE Educational Society	Barinder Singh	President		9829745313	ivyindiaprojects@gmail.com	
7	YADUVANSHI PRIVATE ITI	YADVENDRA	PRINCIPAL	TC229199 - Yaduvanshi pvt iti, hasampur the- neemkathana dist-sikar rajasthan pin code no -332718	8432882688	yaduvanshicollege2008@gmail.com	
8	Nagravision India Pvt. Ltd.	Avinash Yadav	Manager- System Administrator	RMZ Centennial, Tower C unit 301 and 302, Mahadevapura Post ITPL Road, Bangalore	9808326626	avinash.yadav@nagra.com	
9	Sri Rajaram Shikshan Sansthan	Rajendra Parsad	Principle		8808696968	rajendraitijnp@gmail.com	
10	Rastriya Khushali Sansthan	Ramkaran Sinsinwar	President	VOP Tajsar Fatehpur Rajasthan	6350658040	Rkstajsar1998@gmail.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	Siemens Limited	Manoj Belgaonkar	Head – Regulations, Standards and QM	R&D Centre, Thane Belapur Road, Airoli, Navi Mumbai 400708	9820682825	manoj.belgaonkar@siemens.com	
13	Tata Consultancy Services	Sheepara Kaushik	Consultant – Product Development	Kensington B Wing, Hiranandani SEZ, Powai, Mumbai 400076	8433595090	sheepara.sharma@tcs.com	
14	Evergreen Education Trust	Faizanbazaz	Director	217, Pehari Colony Jammu 180005	7006341193	eetturst@gmail.com	
15	Rastriya Khushali Sansthan	Ramkaran Sinsinwar	President	VOP Tajsar Fatehpur Rajasthan	6350658040	Rkstajsar1998@gmail.com	
16	Shiv shakti teckniki evam samanaya shikshan sansthan	Jitendra Kumar Garg	President	B 32 Mahesh nagar jaipur rajasthan-302015	9782912782	jitendra.garg303@gmail.com	
17	Shri Solasar Balaji Shikshan	Nand Kishor Gurjar	SPOC	Rajasthan	9358734466	shribalajiitisujangarh@gmail.com	
18	Shree Hari Shikshan Santhan Aaspura	Mukesh Kumar	SPOC	Rajasthan 341508	7877239952	Harikct2024@gmail.com	
19	YADUVANSHI PRIVATE ITI	YADVENDRA	PRINCIPAL	TC229199 - Yaduvanshi pvt iti, hasampur the- neemkathana dist-sikar rajasthan pin code no -332718	8432882688	yaduvanshicollege2008@gmail.com	
20	Sankalp Education and development socity	Jafruddin Khan	SPOC		8104049522		

21	Shri Prasad Sharma Shikshan Sansthan Myana	Suresh		Gautam Budha Nagar UP	8433476571		
22	Ramyash Pvt ITI	Ramyash	Principel	Jamalpur	9454738298	Yashvantyadav964@gmail.com	
23	B M Upadhyay Shiksha Samiti	K K Upadhyay	SPOC	Agra	9149158684	Kk7500081234@gmail.com	
24	YADUVANSHI PRIVATE ITI	YADVENDRA	PRINCIPAL	TC229199 - Yaduvanshi pvt iti, hasampur the- neemkathana dist-sikar rajasthan pin code no -332718	8432882688	yaduvanshicollege2008@gmail.com	
25	Sri Venkateswara College of Engineering	Dr C Chandrasekhar	Head R &D & Professor in ECE	Karakmbadi Road,Tirupati 517507	9177217190	dr.chandrasekhar.c@sv colleges.edu.in	

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	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	119	116	112	NA	NA	NA	NA	NA	NA	NA	NA	NA
3.0	2023-24	101	101	97	NA	NA	NA	NA	NA	NA	NA	NA	NA

3.0	2024-25	95	66	57	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:

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/N3192: Engage with customer for service of HVAC system	<i>Introduction and Interact with the client prior to initiating work</i>	15	20		4
	PC1. Discuss work requirements with the client, and maintain and repair heating, air conditioning, and ventilation systems as per organizational norms.	3	4		1
	PC2. interact with the client to list the issues and/or requirements and Connect with customer use mobile CRM tools, digital service forms, and IoT-based customer data to schedule visits, understand system usage.	3	4		1
	PC3. plan the daily route based on number of client visits and client locations	3	4		1
	PC4. interpret the symptoms or causes of the problem(s) and the age of the system	3	4		1
	PC5. check the warranty status and annual maintenance contract of the system based on the client's information	3	4		0
	<i>Collate the work requirements</i>	13	16		3
	PC6. analyze the conditions and requirements of the site for the problem identified to arrive at solution	5	6		1
	PC7. check client's requirement and study drawings and layouts of the work site to confirm the feasibility of the solution	4	5		1

	PC8. identify the possible problems in carrying tools/equipment and parts to service or repair the system and find a solution for these	4	5		1
	<i>Provide possible solutions to the client</i>	12	14		3
	PC9. confirm the identified problem(s) with the client and advise the client on possible reasons to arrive at a possible solution	3	4		1
	PC10. inform the client about the time and cost involved	3	4		1
	PC11. identify the best methodology and quickest means for service or repair as per quality standards	3	3		1
	PC12. ensure that client's approval is received on solution, time and cost before taking further action	3	3		0
	NOS Total	40	50		10
ELE/N3140: Service, troubleshoot and repair a HVAC system (chillers)	<i>Perform maintenance of the system</i>	15	18		4
	PC1. identify the process to clean the chiller, cooling tower, condenser, blower, filter, coils and pump valves, Lubricate fan, motor bearings, fan belt tension as per standards and standards operating procedures (SOPs)	3	4		1
	PC2. collect appropriate tools and equipment for maintenance and service	3	4		1
	PC3. perform checks such as water treatment check, proper creation of broken gasket, checks to detect any cracks or leaks and ensure proper insulation lining of water piping	3	4		1
	PC4. ensure to tighten all screws and electrical connections fasteners to remove vibration	3	3		1
	PC5. perform proper procedure to fix damper linkages, set screws, carry out blade adjustments and clean them while ensuring not to lubricate the nylon damper rod bushings	3	3		0
	<i>Troubleshoot and repair the system</i>	15	20		4
	PC6. repair using airflow analyzers, digital multimeters, thermal imaging cameras, and cloud-connected BMS (Building Management System) interfaces for efficient diagnostics.	1	2		1
	PC7. identify issues and troubleshoot low-side components such as air handling unit (AHU), fan and filter	1	2		0
	PC8. check electrical components such as electric circuit, earthing connection, fuses, electrical panels etc. for functioning and make cable connections	1	2		1
	PC9. test the components to correct any noise or vibration in the HVAC system, inappropriate flow of air through the grills and diffusers, filters, contamination and confirm the indoor air quality and cooling temperature/pressure in refrigerant/water lines	2	2		1

	PC10. use manometer to check pressure loss in filters, if any	2	2		1
	PC11. perform appropriate steps to check fan coil unit (FCU), water valves and expansion valves, the motor conditions, overheat, noise, excessive vibration, slow run and failure to start, fix capacitor, relays etc. and leak detection test of refrigerants	1	2		0
	PC12. repair faulty insulation, if any, in refrigerant lines and water pipes	2	2		0
	PC13. use clamp meter to check current and voltage and correct in case of any issues	2	2		0
	PC14. identify faulty electrical components such as capacitor, relay, motor and cables, condenser, evaporator, filter and expansion valve and replace these	2	2		0
	PC15. record and report the repair work done	1	2		0
	<i>Check the performance after service and/or repair</i>	10	12		2
	PC16. check the performance of the HVAC system as per standards and the current range of the supply to the electrical systems is in optimum range	2	3		1
	PC17. test the airflow through the ducts using an anemometer, level of humidity, cooling and heating temperature range as per requirement	2	3		1
	PC18. record dry and wet bulb temperature at each cooling/heating region	3	3		0
	PC19. check the efficiency of the system and record performance parameters of the system	3	3		0
	NOS Total	40	50		10
ELE/N3141 Service, troubleshoot and repair a packaged type HVAC ducted system	<i>Perform Service and Repair of Duct System</i>	11	20		
	PC1. Identify faults in beam clamps, conduits, dampers, pipe and duct hangers, and refrigeration lines.	1	2		
	PC2. Inspect ducts for bends, kinks, cracks, or other physical damages.	1	2		
	PC3. Measure and verify return air, supply air, and duct dimensions as per system design.	1	1		
	PC4. Check the condition and operation of fans, blowers, and motors.	1	2		
	PC5. Clean ducts using appropriate robotic or manual cleaning methods.	1	1		
	PC6. Remove scale deposits from water-cooled condensers.	1	2		
	PC7. Inspect and clean the drainage system of AHU (Air Handling Unit) and FCU (Fan Coil Unit).	1	2		
	PC8. Detect and seal air leaks in ducts effectively.	1	2		
	PC9. Ensure all insulation and acoustic seals are properly tightened and intact.	1	2		
	PC10. Replace damaged or leaking dampers in the ventilation system.	1	2		

PC11. Use appropriate tools and follow safety procedures while performing duct system maintenance.	1	2		
<i>Perform Service and Repair of Packaged Type HVAC System</i>	16	26		
PC12. Check, clean, and tighten electrical terminals, thermostats, and fuses.	1	2		
PC13. Measure and verify voltage balance across phases.	1	1		
PC14. Inspect and clean the cooling tower to maintain performance.	1	2		
PC15. Clean evaporator and air-cooled condenser coils thoroughly.	1	2		
PC16. Inspect belts, pulleys, and bearings; repair and lubricate as required.	2	2		
PC17. Lubricate motor bearings following standard procedures.	1	2		
PC18. Clean or replace air filters to ensure proper airflow.	1	2		
PC19. Inspect refrigerant pressure and repair any leaks found.	1	2		
PC20. Check refrigerant levels and recharge gas as per manufacturer guidelines.	1	2		
PC21. Inspect and replace compressors and metering devices if necessary.	1	2		
PC22. Adjust HVAC system controls as per operational requirements.	2	1		
PC23. Use correct tools and follow safe work practices during repair.	1	2		
PC24. Handle refrigerants carefully, adhering to environmental and safety standards.	1	2		
PC25. Complete maintenance logs and service reports accurately.	1	2		
<i>Check Performance of Ducts and Packaged System</i>	8	9		
PC26. Evaluate cooling and heating efficiency of the system.	1	1		
PC27. Measure airflow using an anemometer to ensure proper circulation.	1	1		
PC28. Check static pressure in the duct system for optimal performance.	1	1		
PC29. Verify refrigerant charge as per system specification.	1	1		
PC30. Inspect and test mechanical components, including gears, for wear or malfunction.	1	1		
PC31. Measure temperature drop across coils to confirm cooling efficiency.	1	2		
PC32. Check system parameters and ensure they match required performance standards.	2	2		
<i>Maintain Safe and Efficient Work Practices</i>	5	5		
PC33. Follow safety procedures while working on HVAC systems and always wear the required Personal Protective Equipment (PPE), such as gloves, goggles, and safety shoes.	1	1		

	PC34.Report unsafe conditions or hazards like gas leaks, electrical faults, or damaged equipment to the supervisor or safety officer immediately.	1	1		
	PC35.Use tools and testing equipment properly, and check that they are in good working condition before use to avoid accidents.	1	1		
	PC36.Handle refrigerants, gases, and chemicals safely as per the manufacturer's instructions and store them securely after use.	1	1		
	PC37.Maintain a clean and organized work area, dispose of waste properly, and use energy and materials efficiently to reduce environmental impact.	1	1		
	TOTAL	40	60		
DGT/VSQ/N0101 - Employability Skills (30 hours)	Introduction to Employability Skills	1	1	-	-
	PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
	Constitutional values – Citizenship	1	1	-	-
	PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
	Becoming a Professional in the 21st Century	1	3	-	-
	PC3.explain 21st Century Skills such as Self Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
	Basic English Skills	2	3	-	-
	PC4. speak with others using some basic English phrases or sentences	-	-	-	-
	Communication Skills	1	1	-	-
	PC5. follow good manners while communicating with others	-	-	-	-
	PC6. work with others in a team				
	Diversity & Inclusion	1	1	-	-
	PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
	PC8. report any issues related to sexual harassment	-	-	-	-
	Financial & Legal Literacy	3	4	-	-
	PC9. use various financial products and services safely and securely	-	-	-	-
	PC10. calculate income, expenses, savings etc.	-	-	-	-

PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	4	6	-	-
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	3	5	-	-
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	2	2	-	-
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & jobs	1	3	-	-
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	20	30	-	-
Grand Total	140	190	-	20

Annexure: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Mention the detailed assessment strategy in the provided template.

1. Assessment System Overview:
 - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
 - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
 - Assessment agency deploys the ToA certified Assessor for executing the assessment
 - SSC monitors the assessment process & records
2. Testing Environment:
 - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
 - Check the duration of the training.
 - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
 - If the batch size is more than 30, then there should be 2 Assessors.
 - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
 - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
 - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
 - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
 - Question papers created by the Subject Matter Experts (SME)
 - Question papers created by the SME verified by the other subject Matter Experts
 - Questions are mapped with NOS and PC
 - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
 - Assessor must be ToA certified & trainer must be ToT Certified
 - Assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
 - Time-stamped & geotagged reporting of the assessor from assessment location
 - Centre photographs with signboards and scheme specific branding
 - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
 - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:

- Surprise visit to the assessment location
- Random audit of the batch
- Random audit of any candidate
- 6. Method for assessment documentation, archiving, and access
 - 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: Each module (which covers the job profile of HVAC (Heating, Ventilation, and Air Conditioning) Technician) will be assessed separately.

1. The candidate must score 50% in each module to successfully complete the OJT.
2. 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.
3. Assessment of each Module will ensure that the candidate is able to:
 - Understand the basic principles of AC, DC and electronic circuits.
 - Work effectively at the workplace
 - Basic health and safety practice.

Annexure: Acronym and Glossary**Acronym**

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards.
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf