QUALIFICATION FILE

Technician Electrical and Electronics Assembly

☐ 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: 4.0

Submitted By:

NETTUR TECHNICAL TRAINING FOUNDATION
23/24, II PHASE, PEENYA INDUSTRIAL AREA,
BENGALURU – 560058, KARNATAKA

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Section 1: Basic Details

1.	**Qualification Name**	**Technician Electrical and Electronics Assembly**	
2.	**Sector/s**	Electrical and Electronics	
3.	**Type of Qualification:** ☑ **New** ☐ **Revised** ☐ **Has Electives/Options** ☐ **OEM**	**NQR Code & version of existing/previous qualification:** (change to previous, once approved)	**Qualification Name of existing/~~previous~~ version:** Technician Electrical and Electronics Assembly/Maintenance
4.	**a. OEM Name** **b. Qualification Name** (Wherever applicable)	NA	
5.	**National Qualification Register (NQR) Code & Version** (Will be issued after NSQC approval)	QG-4-EH-01399-2023-V1-NTTF	**6. NCrF/NSQF Level: 4.0**
7.	**Award (Certificate/Diploma/Advance Diploma/ Any Other** (Wherever applicable specify multiple entry/exits & provide details in annexure)	Advanced Certificate	
8.	**Brief Description of the Qualification**	The candidate will be able to manufacture and assemble various Electrical and Electronic connectors and harness, circuits and components, Industrial electrical-electronic and High-power conditioning, and Aerospace industry. Maintenance and troubleshooting of Power Systems. The subjects covered in this programme are – Industrial Electronics, Digital Electronics, Material Technology, Sensors and Transducers, Assembling and Testing of Product, Soldering Techniques, Microcontrollers and Applications, Pneumatics, Programmable Logic Controller, Quality Management System, Manufacturing Engineering, Wire Harness- Types, Specification and Standards, Employability Skills, Digital Electronics Lab, Industrial Electronics Lab, Sensors and Transducers Lab, Microcontrollers and Applications Lab, PLC Lab, Pneumatics Lab, OJT	

<table>
<tr><td>9.</td><td>Eligibility Criteria for Entry for Student/Trainee/Learner/Employee</td><td colspan="2">a. Entry Qualification & Relevant Experience:
<table>
<tr><th>Sl. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Required Experience (with Specializatio</th></tr>
<tr><td>1</td><td>12th Pass (with Mathematics)
OR
10th + 2 years ITI in the following trades:
Electrical, Electronics and Instrument technician and relevant trades.
OR
10th + 2 years diploma /pursuing 3rd of diploma in relevant trade
OR
Certificate - Fitter- Electrical and Electronics Equipment. (Level 3.5) from NTTF</td><td>NA</td></tr>
</table></td></tr>
<tr><td>10.</td><td>Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>Total Credits – 40</td><td>11. Common Cost Norm Category (I/II/III) (Wherever applicable): NA</td></tr>
<tr><td>12.</td><td>Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">NA</td></tr>
<tr><td>13.</td><td>Training Duration by Modes of Training Delivery
(Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="2">☐ Offline ☐ Online ☑ Blended
<table>
<tr><th>Training Delivery Modes</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>OJT Mandatory (Hours)</th><th>OJT Recommended (Hours)</th><th>Total (Hours)</th></tr>
<tr><td>Classroom (offline)</td><td>250</td><td>150</td><td>570</td><td></td><td>970</td></tr>
<tr><td>Online</td><td>230</td><td></td><td></td><td></td><td>230</td></tr>
</table>
(Refer Blended Learning Annexure for details)</td></tr>
<tr><td>14.</td><td>Aligned to NCO/ISCO Code/s
(if no code is available mention the same)</td><td colspan="2">NCO Code –2015/3113.0101, 2015/3114.0100</td></tr>
</table>

15.	**Progression path after attaining the qualification.** (Please show Professional and Academic progression)	**Professional Progression:** After Completion of 1 or 2 years of Full Time Programme can work as Technician Electrical and Electronics After Completion of 3 years of Full Time Programme and after 3 years of Industry Experience the Job Holder can work as Line Supervisor, Maintenance engineer, Quality inspector, Team leader, Maintenance manager. **Academic Progression:** NTTF - Diploma in Electrical Equipment Manufacturing(Level 4.5), Post Diploma, B. VoC and B.Tech Degree Course in Relevant field After Completion of 3 years of Full Time Programme and after 3 years of Industry Experience the Job Holder **Vertical Progression:** Senior Technician - Engineer - Supervisor – Manager	
16.	**Other Indian languages in which the Qualification & Model Curricula are being submitted**	Hindi	
17.	**Is similar Qualification(s) available on NQR-if yes, justification for this qualification**	**☐ Yes ☑ No URLs of similar Qualifications: NA**	
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**	Yes - Admission open to women candidates (30% seats reserved for women)	
20.	**Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)**	**☐Yes ☑ No**	
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. R Rajagopalan** Position in the Organization: **Joint Managing Director** **Email:** rg@nttf.co.in Tel number: 080 – 28390215 **Contact No.:** 9844013448 **Website: nttftrg.com**	
23.	**Final Approval Date by NSQC: 30 Nov 2023**	**24. Validity Duration: 3 Years**	**25. Next Review Date: 30 Nov 2026**

Section 2: Module Summary

NOS/s of Qualifications (In exceptional cases these could be described as components)

Mandatory Module/NOS/s: Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document. – In Annexure

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

Sl. 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					Weightage (%) (if applicable)
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	
Semester – 3																
1	Industrial Electronics	CP34301T	Core	4.0		45	-	-	-	45	100	-	-	-	100	
2	Digital Electronics	CP34302T	Core	4.0		45	-	-	-	45	100	-	-	-	100	
3	Material Technology	CP34303T	Core	4.0		30	-	-	-	30	100	-	-	-	100	
4	Sensors and Transducers	CP34304T	Core	4.0		45	-	-	-	45	100	-	-	-	100	
5	Elective -5/6 (Choose One)	CP3430X*T	Core	4.0		45	-	-	-	45	100	-	-	-	100	
6	Digital Electronics Lab	CP34307P	Core	4.0	20	-	30	-	-	30	-	75	-	25	100	
7	Industrial Electronics Lab	CP34308P	Core	4.0		-	30	-	-	30	-	75	-	25	100	
8	Sensors and Transducers Lab	CP34309P	Core	4.0		-	15	-	-	15	-	75	-	25	100	
9	OJT	CP34310P	Core	4.0		-	-	285	-	285	-	75	-	25	100	
10	Employability Skills	CP34311T	Core	4.0		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					**40**	**240**	**75**	**285**	-	**600**	**575**	**300**	-	**125**	**1000**	
Semester – 4																
11	Microcontrollers and Applications	CP34401T	Core	4.0		60	-	-	-	60	100	-	-	-	100	
12	Pneumatics	CP34402T	Core	4.0		30	-	-	-	30	100	-	-	-	100	
13	Programmable Logic Controller	CP34403T	Core	4.0		45	-	-	-	45	100	-	-	-	100	
14	Quality Management System	CP34404T	Core	4.0		30	-	-	-	30	100	-	-	-	100	
15	Elective - 7/8 (Choose One)	CP3440X*T	Core	4.0		45	-	-	-	45	100	-	-	-	100	
16	Microcontrollers and Applications Lab	CP34407P	Core	4.0	20	-	15	-	-	15	-	75	-	25	100	
17	PLC Lab	CP34408P	Core	4.0		-	30	-	-	30	-	75	-	25	100	
18	Pneumatics Lab	CP34409P	Core	4.0		-	30	-	-	30	-	75	-	25	100	
19	OJT	CP34410P	Core	4.0		-	-	285	-	285	-	75	-	25	100	
20	Employability Skills	CP34411T	Core	4.0		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					**20**	**240**	**75**	**285**	-	**600**	**575**	**300**	-	**125**	**1000**	
Total for 1-year Programme					**40**	**480**	**150**	**570**	-	**1200**	**1150**	**600**		**250**	**2000**	

Elective Modules/ NOS/s:

Sl. 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)
Semester – 3 (Elective NOS/s: Elective 5/6 (CP3430X*T))																
5	Assembling and Testing of Product	CP34305T	Core	4.0	-	45	-	-	-	45	100	-	-	-	100	
6	Soldering Techniques	CP34306T														
Semester – 4 (Elective NOS/s: Elective 7/8 (CP3440X*T))																
7	Manufacturing Engineering	CP34405T	Core	4.0	-	45	-	-	-	45	100	-	-	-	100	
8	Wire Harness- Types, Specification and Standards	CP34406T														

Optional NOS/s:

Sl. 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: (Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear assessment)

To pass the Qualification, the trainee should score minimum of 40% in each Theory, 50% in each Practical and 60% in OJT.

Section 3: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	Diploma in relevant field with 3 years as trainer or industry experience B. Tech or BE with 2 years of trainer or industry experience
2.	**Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	Diploma in relevant field with 5 years as trainer or industry experience B. Tech or BE with 5 years of trainer + industry experience
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 with 4 years as trainer or industry experience B. Tech or BE with 3 years as trainer or industry experience
2.	**Proctor's Qualification and experience in relevant sector (in years)** (as per NCVET guidelines)	Diploma or B. Tech or BE with 2 years of experience
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** (as per NCVET guidelines)	Diploma with 4 years as trainer or industry experience B. Tech or BE with 3 years as trainer or industry experience
4.	**Assessment Mode** (Specify the assessment mode	Theory and Practical (Offline)
5.	**Tools and Equipment Required for Assessment**	Same as for training ☑ Yes ☐ No *(details to be provided in Annexure-if it is different for Assessment)*

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	**Research Reports:** The following reports establish the Skilled Resource requirement for the Electrical and Electronics Engineering, a. MSDE Annual Report 2021- 2022 predicts skilled manpower requirement in the Power and Renewable energy sectors. b. Annual report 2021-22 from Ministry of new and Renewable Energy has projected requirement of skilled manpower in the area. c. Annual report 2021- 2022 Ministry of Power has projected energy demand for various sectors. The above two will lead to Higher requirement in Electrical and Electronics Engineers in large numbers in the Future. d. Annual reports 2021 – 22 of Ministry of Heavy Industries Government of India. The Study has found Higher growth in Manufacturing, Capital Goods and Automotive Industries which will require Qualified Technicians in Electrical and Electronics skills.
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No):** The following reports establish the Skilled Resource requirement for the Manufacturing, Capital Goods and Automotive Industries a. Indian Skills Report 2021-22 by **Wheebox** - partnered **CII** predicts skill requirement in Engineering and Manufacturing sectors and Energy and Core sectors. b. NASSCOM, FICCI and EY report on **Future of Jobs in India 2022 -** Perspective predicts higher growth in Component Manufacturing and Automotive sector.
3.	**Government /Industry initiatives/ requirement (Yes/No): YES** a. Study on Job Role of the Future by Indian Institute of Skills. b. National Policy for skill Development and Entrepreneurship 2015 by MSDE has predicted skilled manpower requirement across key sectors by 2022 and has framed many initiatives.
4.	**Number of Industry validation provided: 12**
5.	**Estimated nos. of persons to be trained and employed: 1900 / year**
6.	**Evidence of Concurrence/Consultation with Line Ministry/State Departments: (Letter to be sent to the concerned ministry and copy attached)**If “No”, why: Under Process

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	**Annexure 1**: NCrF/NSQF level justification based on NCrF Level / NSQF descriptors (Mandatory)	Yes
2.	**Annexure 2:** List of tools and equipment relevant for qualification (Mandatory, except in case of online course)	Yes
3.	**Annexure 3:** Industry Validations Summary	Yes
4.	**Annexure 4**: Training & Employment Details	Yes
5.	**Annexure 5:** Blended Learning (Mandatory, in case selected Mode of delivery is "Blended Learning")	Yes
6.	**Annexure 6:** Detailed Assessment Criteria (Mandatory)	Yes
7.	**Annexure 7:** Assessment Strategy (Mandatory)	Yes
8.	**Annexure13:** Multiple Entry-Exit Details (Mandatory, in case qualification has multiple Entry-Exit)	No
9.	**Annexure:** Acronym and Glossary (Optional)	Yes
10.	**Supporting Document**: Model Curriculum (Mandatory – Public view)	Digital content available to trainees through Edusquares ERP (Will be made public after the qualification is approved) (Annexure 8)
11.	**Supporting Document:** Career Progression (Mandatory – Public view)	Yes (Annexure 9)
12.	**Supporting Document:** Occupational Map (Mandatory)	Yes (Annexure 11)
13.	**Supporting Document:** Assessment SOP (Mandatory)	Yes (Annexure 10)
14.	**Supporting Document:** Key Learning Outcome	Yes (Annexure 12)
15.	**Any other document you wish to submit:**	No

Annexure 1: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/ NSQF Level
Professional Theoretical Knowledge/Process	Describe the Power devices and its characteristics. Understanding the construction of different power devices, analysis of different power circuits. Knowledge and understanding of Number systems, codes, Logic gates, logical circuit reduction techniques, combinational and Sequential circuits Describe the properties of Engineering materials and use. Explain the Working of sensors and transducers Describe THT and SMT Knowledge on Connector assembly Explain the architecture, codes and perform programming of Micro-controllers. Explain the prescribed method for measuring various profiles and dimensions using appropriate devices.	Read and comprehend the datasheet of Electronic Components. Troubleshooting and maintenance of power devices and circuits in domestic and industrial applications. Identify, analyse and trouble shoot different Logical circuits. Application of ferrous, non-ferrous metals, alloys, insulators and conductors Identification, Specification and Selection of Mechanical, Electrical and Proximity Sensors Testing and Inspection of Connectors Design and develop any microcontroller application circuits Application of technical and professional skills that are essential in quality control to perform accurate and repeatable measurements	**4.0**

Professional and Technical Skills/ Expertise/ Professional Knowledge	Identify and describe the types of PCB Describe Through hole and Surface Mount Technology Explain the soldering process Hands-on on Pneumatic components, circuits design and control. Perform PLC Programming and control. Simulation and Testing of Power Circuits. Demonstrate the working of Sequential Circuits Explain the architecture, codes and perform programming of Micro-controllers Can do continuous improvement in processes (KAIZEN)	Assemble components and solder PCB Maintenance and troubleshooting of various process and controls in any process industry. Perform Data analysis and management in automation industry. Perform Maintenance and troubleshooting of Power Systems Analyse, design and implement sequential logic circuits. Design, analyse and troubleshoot simple Power circuits Design and develop any microcontroller application circuits	**4.0**
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Explain Diversity, inclusion, gender sensitivity. Describe Goal setting and career development. Describe Analytical thinking and adaptive thinking. Explain about Financial and Legal literacy. Specify Occupational Safety, Health, and Environment education.	Propagate inclusiveness and team working. Propagate Personal development and team building. Developing creativity and reasoning, making decisions in dynamically challenging situations. Good understanding of various statutory and legal benefits and requirements of an employee. Knowledge of Occupational safety hazards and methods to mitigate them.	**4.0**

Broad Learning Outcomes/Core Skill	Practical hands-on experience on Power electronics Perform programming of Micro-controller and its applications Hands on experience on Pneumatics and PLC.	Maintenance and troubleshooting of Power Systems. Design and develop microcontroller application circuits. Maintenance of Instrumentation Process control systems.	**4.0**
Responsibility	Awareness of safety Procedures and SOPs in the relevant work area. Identify, monitor and report occurrences in the work area. Test and calibrate the equipments.	Work effectively in any component assembly. Assist Maintenance activity in industry. Can work independently. Able to assemble, install, test and calibrate Equipments and products in relevant field	**4.0**

Annexure 2: Tools and Equipment (Lab Set-Up)

Tools and Equipment requirement for a batch of 30 Trainees

Equipment / Machineries available at the OJT Industry

SL. NO.	NAME OF THE TOOL AND EQUIPMENT	SPECIFICATION	QUANTITY
1	Analog Oscilloscope	No of Channels - 2, Bandwidth: DC - 20 MHz	05
2	Dual - Power Supplies Regulated Power Supply, Adjustable	0-30V/1A	05
3	Function Generator	Frequency Range: 0.3 Hz to 3 MHz, Functions: Sine, Square, Triangle, DC Sweep	05
4	Soldering Station - Temperature Controllable		01
5	LCR - Q Bridge		01
6	IC Tester (for Digital IC's)		01
7	Digital Trainer Kit	Fixed +5V/ 1Amp, 16pin ZIF Socket, Logical switch with I/O Indicators, 4mm patch cords with short circuit and Overload Protection.	05
8	Soldering Iron	20W	05
9	Fuse	HRC 16A with Holders	03
10	MCB	2 pole, 10A/9kA, C type	01
11	Crimping tool		01
12	Displacement Measuring system	LVDT 0-20mm With Instrumentation Amplifier & Digital Display	01
13	PLC Programming Software		05
14	Microcontroller Trainer Kit	8051 /AT89S52 Development Board with Interfacing Modules.	03
15	IoT Trainer Kit		01
16	PIC Development Board	With Interfacing modules	01
17	PIC Kit 3		01
18	Sensor Trainer Kit with Assorted Sensors		01

MECHANICAL TOOLS			
19	Workbench with Lockers - 4 Vices/Bench	1.5mX0,8mX0.7m	01
20	Bench Vice	125mm	04
21	Flat bastard file	300mm	04
22	Steel Rule	150mm	05
23	Cleaning Brush	100mm	03
24	Floor Brush	250mm	01
25	Vernier caliper	150mm, LC 0.02	03
26	Micrometer (External)	0-25	03
27	Nose plier	Long Nose – 170mm	01
28	Screwdriver Set	6.0 x 0.8, 3.5 x 0.5	01
29	Bench Drilling Machine with Accessories	0-12mm	01
30	Computer		10
Equipment / Machineries available where OJT is being conducted			

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. Black / white board
2. Projector with screen / Display TV
3. Laptop / computer

Annexure 3: Industry Validations Summary

Provide the summary information of all the industry validations in table. This is not required for OEM qualifications.

Sl. No.	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile
1	M/s. Delta Electronics Rudrapur	Mr. Bhasker		Plot No. 38, Phase 1, Sector - 5, SIDCUL Industrial Area Road, Udham Singh Nagar, Rudrapur, Uttarakhand 263153	9319369583	bhaskersingh234@gmail.com	
2	M/s. Emtech Foundation Faridabad	Mr. Naveen Manchanda		E5 Basement, Nehru Ground, New Industrial Twp 1, New Industrial Town, Faridabad, Haryana 121001	9278705959	naveen@emtech.in	
3	M/s. Schneider Electric IT Business Pvt Ltd.	Mr. Sinchan Gowda		3 &188/3,jigani road, Bommasandra Industrial Area, Bengaluru	8496014279	Sinchan.sy@non.se.com	
4	M/s. Essae Electronic	Mr. Roopesh kumar		Bommasandra industrial Area, Bengaluru	9448553535	eeplmca@essae.com	
5	M/s. Lighting Technology	Mr. Arun		No,40 Jigani Industrial Area, 1st Phase Sy.No 592&124, Anekal taluk, Jigani ,Bengaluru	8312070395	marcom.ind@ltcompany.com	https://www.linkedin.com/in/arun85kp
6	M/s. Molex India Pvt Ltd, Kadugudi	Mr. Avinash		6A,sadaramangala industrial Area, Kadugodi, Bengaluru	8867048067	pallavi.ranganath@molex.com	
7	M/s. Amphenol Interconnect Pvt Ltd	Mr. Uday		61,Electronics city phase 1, Electronics city, Bengaluru	8548068683	vbhavsar@amphenol-in.com	
8	M/s. Avalon Technology And Services Pvt Ltd	Mr. Raghunath		No. 23, J.K. Tech square, behind lemon tree hotel, EPIP Zone, Whitefield, Bengaluru	9164281155	compliance@avalontec.com	
9	M/s. Kalpa Electrical Pvt Ltd	Mr. Ravindra		NO.4413 3rd main road, Rajaji nagar, Industrial town, Ranaji nagar, Bengaluru 560010	8023405248		
10	M/s. Bosch Automotive Electronics India	Mr. Syedaltaf		No.704,Electronics city road, Naganathapura, Bengaluru	9845062440		
11	M/s. Lotus Powergear Pvt Ltd	Mr. Sivakumar		2/13th Km, Kanakapura Road, Doddakallasandra, Bengaluru, Karnataka 560062	9945232484	ananda.bhatta@lotuspowergear.co.in	

12	M/s. Rossell Tech Sys	Mr. Venkatachellam vasudevan		Plot no-58C (Aerospace sector) at Hitech Defence & Aerospace park, Devanahalli , Bengaluru	9943674556	venkatachalam.vasudevan@rossel techsys.com	

Annexure 4: Training & Employment Details

Training and Employment Projections: Data to be provided year-wise for next 3 years

Year	Total Candidates		Women		People with Disability	
	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities
2023	1800	More than 7000	180	More than 2000	-	-
2024	1900	More than 7000	190	More than 2000	-	-
2025	1900	More than 7000	190	More than 2000	-	-

Training, Assessment, Certification, and Placement Data for previous versions of qualifications: (Previous years)

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed / Higher Studies	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
New Qualification	2017 - 2020	269	241	237	179	31	27	27	25	NIL			
	2018 - 2021	251	224	221	176	18	16	16	13				
	2019 - 2022	35	31	31	21	26	23	23	17				

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:

2nd year of 3 years Full Time diploma Programme

Content availability for previous versions of qualifications:

☐ Participant Handbook ☐ Facilitator Guide ☑ Digital Content ☐ Qualification Handbook ☑ Any Other: In NTTF LMS and Edusquares ERP

Languages in which Content is available: English.

Annexure 5: 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

Sl. 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	Physical classroom, LMS, Web based, Online sessions	70:30
2	Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	Workshops, Mock sessions, Case study, Role play, Group Discussions, Sensitivity training, Transactional analysis.	95:05
3	Showing Practical Demonstrations to the learners	Using industry equipment and machinery, Workshop / Lab, Simulators	100:0
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Work on real time industry job, job rotation, job/process instructions, Workshop machines, Lab equipment, Simulators.	90:10
5	Tutorials/ Assignments/ Drill/ Practice	Class assignments, LMS assignments, Simulators	60:40
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	Physical classroom, Labs, Workshop, Quiz tests, Project	100:0
7	On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training	In the Industry	100:0

Annexure 6: 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
Semester – 3					
Industrial Electronics	Knowledge of various parameters and parts of motors	25	-	-	-
	Knowledge of various parameters of power semiconductor devices	20	-	-	-
	Knowledge of various parameters and parts of power supplies, inverters and UPS	25	-	-	-
	Various parameters of PCB	10	-	-	-
	Knowledge of Electromechanical devices and their assembly	20	-	-	-
	Total Marks	100			
Digital Electronics	Basic knowledge of digital electronics	10	-	-	-
	Number systems and their conversion	10	-	-	-
	Draw Boolean Algebra and design Logic gates	15	-	-	-
	Design of combinational and Sequential logic circuits	30	-	-	-
	Use of Latches and Flip-flops	20	-	-	-
	Knowledge of types of memory	15	-	-	-
	Total Marks	100			
Material Technology	Properties of Materials, ferrous metals, standard steel selection.	40	-	-	-
	Properties of Non – Ferrous Metals and Alloys, Plastics and their selection.	40	-	-	-
	Use of insulators and conductors	20	-	-	-
	Total Marks	100			
Sensors and Transducers	Knowledge of mechanical and electrical transducers	30	-	-	-

	Knowledge of various sensors	20	-	-	-
	Feedback methods in electronic circuits	50	-	-	-
	Total Marks	100			
Elective (Assembling and Testing of Product)	Knowledge of insulation stripping, crimp connection and connector assembly	60	-	-	-
	Identify the harness, assembling of connectors and testing them	40	-	-	-
	Total Marks	100			
Elective (Soldering Techniques)	Designing of PCB layout, types of PCBs,	30	-	-	-
	Mounting of components, soldering techniques	30	-	-	-
	Preparing a surface mounted through hole assembly PCB	40	-	-	-
	Total Marks	100			
Employability Skills	Diversity and Inclusion, Gender sensitivity PwD etc.	15	-	-	5
	Career development and Goal setting	20	-	-	10
	Entrepreneurship	15	-	-	5
	Analytical thinking and Adaptive Thinking	25	-	-	5
	Total Marks	100			
Digital Electronics Lab	Design logic gates: NAND, NOR gates	-	25	-	10
	Knowledge of Boolean Algebra, design circuits: multiplexers and demultiplexers	-	25	-	5
	Design Half adder and Full adder	-	25	-	10
	Total Marks	100			
Industrial Electronics Lab	Use of Protecting Devicesl	-	25	-	10
	Selection and use of motors	-	25	-	10
	Design and fabricate a PCB	-	25	-	5
	Total Marks	100			

Sensors and Transducers Lab	Use of Mechanical sensors, Electrical transducer	-	25	-	10
	Use of Proximity Sensors: Reed Sensor, Inductive, Capacitive, Optical proximity sensor.	-	50	-	15
	Total Marks	100			
OJT	Describe various logic circuits used in the Industry	-	40	-	10
	Describe specifications of motors and sensors used in the industry	-	35	-	15
	Total Marks	100			
Semester – 4					
Microcontrollers and Applications	Knowledge about architecture of 8051	20	-	-	-
	Programming of 8051	25	-	-	-
	Use of peripheral of 8051 and Interfacing	20	-	-	-
	Design applications of 8051	15	-	-	-
	Knowledge about architecture of PIC microcontroller	10	-	-	-
	Knowledge of Fuzzy logic	10	-	-	-
	Total Marks	100			
Pneumatics	Knowledge of various components of Pneumatic System	30	-	-	-
	Measure pressure of air	20	-	-	-
	Knowledge of various tools used in Pneumatic System	30	-	-	-
	Knowledge of applications of Pneumatic Systems in industry	20	-	-	-
	Total Marks	100			
Programmable Logic Controller	Architecture of PLC	10	-	-	-
	Programming of PLC	25	-	-	-
	Various functions of PLC: Basic and Intermediate	25	-	-	-
	Handling of data through PLC	20	-	-	-
	Applications of PLC	20	-	-	-

	Total Marks	100			
Quality Management System	Concepts of Quality in manufacturing	10	-	-	-
	Knowledge of various quality tools and use of 7 QC tools	15	-	-	-
	Finding the root cause and taking corrective action	10	-	-	-
	Knowledge and concepts of TQM	20	-	-	-
	Conduct of inspection for quality	10	-	-	-
	Knowledge and concepts of FOD	15	-	-	-
	Knowledge and concepts of Lean Management	20	-	-	-
	Total Marks	100			
Elective (Manufacturing Engineering)	Industrial safety and use of PPEs	5	-	-	-
	Use of correct hand tools	15	-	-	-
	Drilling operation	15	-	-	-
	Linear and angular measurement	20	-	-	-
	Use of gauges for measurement	10	-	-	-
	Concept of Limits and Fits	15	-	-	-
	Concept of cycle time and techniques to reduce	10	-	-	-
	Concept Production and Productivity Management	10	-	-	-
	Total Marks	100			
Elective (Wire Harness- Types, Specification and Standards)	Use of Adhesives and Sealants	10	-	-	-
	Selection of Adapters, Cable Assemblies and Cable Feed throughs	30	-	-	-
	Knowledge of Shipboard Electrical Splice Kits (SESK), Ship or Shore - Breakout kits	40	-	-	-
	Selection of Electrical Interconnect, Data Bus Components, and connectors	20	-	-	-
	Total Marks	100			

Microcontrollers and Applications Lab	Configuration and pin details of 8051 Microcontroller	-	10	-	-
	Programming of 8051 Microcontroller	-	20	-	10
	Configuration and pin details of PIC Microcontroller	-	20	-	15
	Application of Microcontroller – Interfacing Sensor, Display Devices, Assembly line	-	25	-	-
	Total Marks	100			
Employability Skills	Financial and Legal Literacy	20	-	-	10
	Occupation safety, Health, and Environment education.	20	-	-	5
	Digital Literacy Skills	15	-	-	5
	Essential skills for success.	20	-	-	5
	Total Marks	100			
PLC Lab	Architecture & configuration of PLC	-	20	-	5
	Programming of PLC	-	25	-	10
	Building logic function, time and counter using PLC	-	30	-	10
	Total Marks	100			
Pneumatics Lab	Knowledge of Compressor and its parts, Single and double acting cylinder, Direction and Flow control valve	-	25	-	5
	Simulation of basic Pneumatic circuits	-	25	-	10
	Rigging of basic Pneumatic circuits	-	25	-	10
	Total Marks	100			
OJT	Details of the machines and specifications	-	40	-	10
	Methods adopted to reduce waste	-	35	-	15
	Total Marks	100			

Annexure 7: Assessment Strategy

1. ASSESSMENT STRATEGY:

The Criteria for assessment based on Modules, will be assigned marks proportional to its importance.

The assessment for the semester-based qualification is carried out by conducting Formative and Summative Assessments.

Regarding Theory – Sessional is based on Intermediate Tests, File / Assignments & Viva –voce: Semester end examination wherein for each Individual batch, A&E dept. at Corporate office, Bangalore creates unique question papers for theory part as well as practical – Theory comprises of MCQ and descriptive questions drawn randomly from Question Bank.

Regarding the practical part, the experiments/ exercises are performed by the trainees during the LAB Hours and the trainees are allowed to record the learning of it which will be carried as their Record Marks & one Lab Test and semester end examination. Semester end examination is outcome-based experiments/ exercises of the course will be given to trainees to perform and based on the performance the mark will be awarded. The passing criteria is based on practical's performance, viva or oral exam, Test and final semester end examination.

Theory and practical Examinations are carried out with Examiners under the overall supervision of the Assessment & Evaluation Dept.

Evaluation of Theory & Practical examination is carried out by the Trained Assessors (NTTF faculty members) under the supervision of Shopfloor Manager / Principal in a fair manner as per the assessment criteria set by A&E dept. of NTTF.

The Tabulation and processing of results shall be carried out under EDUSQUARE campus Software.

Assessors / Faculties are trained from time to time to upgrade their skills on various aspects such as conduction of assessments, teaching methodology etc.

Assessment comprises the following components:

- Job carried out in Labs / workshops
- Record book
- ONLINE Examination
- Answer sheet of assessment
- Viva-voce
- Semester end examination
- ON-THE-JOB training
- Attendance and punctuality

2. ASSESSORS:

Evaluation of Theory & Practical examination is carried out by the Trained Assessors (NTTF faculty members) in a fair manner as per the assessment criteria set by A&E dept. of NTTF.

Assessors / Faculties are trained from time to time to upgrade their skills on various aspects such as conduction of assessments, teaching methodology etc.

3. ELIGIBILITY TO APPEAR FOR THE EXAM:

- The candidates should have an attendance of a minimum 80% in a semester.
- The candidates should have secured minimum Sessional Marks in Theory & Practical

4. PASS CRITERIA:

To pass the Qualification, every trainee should score a minimum of 40% in each Theory and 50% in each Practical and 60% in OJT / Projects.

5. RESULTS AND CERTIFICATION:

The assessment results are backed by evidence collected by assessors. Successful trainees are awarded the Diploma certificate by NTTF Corporate Office.

6. ON THE JOB:

1. The candidate must score 60% 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
3. Assessment will ensure that the candidate is able to:
   - Effective engagement with the customers
   - Understand the working of various tools and equipment.

7. SYSTEM OF GRADING:

An alphabetical letter grade will be assigned for each subject based on the total marks scored in the sessional and end semester examination.

Equivalent Grade Points are used: A = 9.5, B = 8.5, C = 7.5, D = 6.5, E = 5.5, F = 0 (FAIL), I = Incomplete (MP/AB/SP) Supplementary cleared = E

The student will be issued Semester Grade Report calculating SGPA / CGPA as follows:

$$\text{Semester Grade Point Average (SGPA)} = \frac{\Sigma \text{ (No. of Credits x Grade Point)}}{\Sigma \text{ (No. of Credits for the Program)}}$$

$$\text{Cumulative Grade Point Average (CGPA)} = \frac{\sum \text{ (SGPA} \times \text{total Credits of each semester)}}{\text{Total credits Acquired.}}$$

Awarding of class:

a) Awarding of class for semester:

SGPA	Classification
8.5 and above	First class with distinction
7.5 to 8.4	First class
6.0 to 7.4	Second class
5.5 to 5.9	Pass class

b) Awarding of class for Programme:

First class with Distinction	Should have scored CGPA 8.5 and above and should have cleared all Semesters in the first attempt.
First class	Should have scored CGPA 7.5 to 8.4
Second class	Should have scored CGPA 6.0 to 7.4
Pass class	5.5 to 5.9

8. ASSESSMENT TOOLS:

All assessment and evaluation activities are carried out under EDUSQUARE campus software which includes Formative assessment & Summative assessment.

- EDUSQUARE : NTTF ERP/CRM used for academic purpose EDUSQUARE erp.nttftrg.com used as SaaS (software as a service) mode
- Digital Valuation System: Digital Valuation system is an innovative software solution which automates manual evaluation and help institutions to minimize the time, effort and human errors in the entire valuation process.
- Remote proctoring which includes AI based Auto Proctoring , Student authentication & Multi secure Exam browser

List of ICT Tools:

Desktop and laptops
Interactive While Board
CCTV Camera
Pen Drive
Video Conferencing
Biometric
Edusquare: NTTF ERP/CRM used for academic purpose Edusquare erp.nttftrg.com used as SaaS (Software as a Service) mode
Networking: Includes Wireless access Points, Switches, Routers, Controllers across all NTTF
AWS Cloud: AWS Cloud computing platform to host NTTF website www.nttftrg.com and used as backup storage.
Firewall: Network security device protecting our network by filtering traffic and blocking outsiders.
Microsoft (O365/M-365) – Email/office (Word, Excel, PPT, One Drive for all staff/students are provided using Microsoft O365 MDM (BYOD) policies implemented through M365 used as SaaS.

Annexure 8: Model Curriculum

Semester – 3	Module Name: Industrial Electronics	Module Code: CP34301T
Sl. No.	**Module Details**	**Theory Hours 45**
1	Introduction	2h
2	Motor	6h
3	Power Semiconductor devices	8h
4	Inverters	6h
5	Power supplies	4h
6	UPS	3h
7	Basics of PCB	8h
8	Electromechanical devices	6h
9	Handling of Electronic components	2h
	Total Hour	**45 h**

Semester – 3	Module Name: Digital Electronics	Module Code: CP34302T
Sl. No.	**Module Details**	**Theory Hours 45**
1	Introduction to digital electronics	2h
2	Number systems and codes	4h
3	Logic gates and Boolean Algebra	8h
4	Combinational logic circuits	10h
5	Latches and Flip-flops	8h
6	Sequential Logic Circuits	10h
7	Types of memory	3h
	Total Hour	**45 h**

Semester – 3	Module Name: Material Technology	Module Code: CP34303T
Sl. No.	**Module Details**	**Theory Hours 30**
1	Properties of Materials	4h
2	Ferrous Metals	6h
3	Standard Steel Section and Sheets –Referring Standards	5h
4	Non – Ferrous Metals and Alloys	5h
5	Plastics	5h
6	Insulators	3h
7	Conductors	2h
	Total Hour	**30 h**

Semester – 3	**Module Name: Sensors and Transducers**	**Module Code: CP34304T**
Sl. No.	**Module Details**	**Theory Hours 45**
1	Mechanical Transducers	12h
2	Electrical Transducers	16h
3	Proximity Sensors	8h
4	Feed Back Instruments	9h
	Total Hour	**45 h**

Semester – 3	**Module Name: Assembling and Testing of Products – Elective (Industry Specific) Module Code: CP34305T**	
Sl. No.	**Module Details**	**Theory Hours 45**
1	Stripping Insulation from Conductors Cable	8h
2	Crimp Connections	10h
3	Connector Assembly	10h
4	Harness Identification	7h
5	Connector Mating Testing and Inspection	10h
	Total Hour	**45 h**

Semester – 3	**Module Name: Soldering Techniques – Elective (Industry Specific)**	**Module Code: CP34306T**
Sl. No.	**Module Details**	**Theory Hours 45**
1	Introduction to Connectivity	6h
2	Types of Printed Circuit Board	3h
3	Circuit Components	6h
4	Soldering Temperature Characteristics	6h
5	Soldering	12h
6	Through Hole Assembly Technology	6h
7	Surface Mount Technology	6h
	Total Hour	**45 h**

Semester – 3	**Module Name: Digital Electronics Lab**	**Module Code: CP34307P**
Ex. No.	**Module Details**	**Piratical Hours 30**
1	Familiarization of Logic Gates	5h
2	Universal Property of NAND, NOR gates	5h
3	Boolean Algebra	6h
4	Multiplexer	4h

5	Demultiplexers	4h
6	Half adder and Full adder	6h
	Total Hour	**30 h**

Semester – 3	**Module Name: Industrial Electronics Lab**	**Module Code: CP34308P**
Ex. No.	**Module Details**	**Piratical Hours 30**
1	Familiarization of Protecting Devices	10h
2	Familiarization of Motors	10h
3	Familiarization of PCB Fabrication process	10h
	Total Hour	**30 h**

Semester – 3	**Module Name: Sensors and Transducers Lab**	**Module Code: CP34309P**
Ex. No.	**Module Details**	**Piratical Hours 15**
1	Mechanical sensors – Identification and Specification – Thermocouple, Load cell	4h
2	Electrical transducer – Identification and Specification – Strain Gauge, Photoelectric.	5h
3	Proximity Sensors – Identification and specification – Reed Sensor, Inductive, Capacitive, Optical proximity sensor.	6h
	Total Hour	**15 h**

Semester – 3	**Module Name: OJT**	**Module Code: CP34310P**
Sl. No.	**Module Details**	**Practice Hours 285**
1	On the Job Training in the relevant sector	285 h
	Total Hours	**285 h**

Semester - 3	**Module Name: Employability Skills**	**Module Code: CP34311T**
Sl. No.	**Module Details**	**Theory Hours 30**
1	Diversity and Inclusion, Gender sensitivity PwD etc.	9h
2	Career development and Goal setting	6h
3	Entrepreneurship	6h
4	Analytical thinking and Adaptive Thinking	9h
	Total Hours	**30 h**

Semester – 4	**Module Name: Microcontrollers and Applications**	**Module Code: CP34401T**
Sl. No.	**Module Details**	**Theory Hours 60**
1	Introduction to Microcontroller	2h
2	Architecture of 8051	6h

3	Programming to 8051	16h
4	Peripheral of 8051 and Interfacing	14h
5	Application of 8051	6h
6	Introduction to PIC microcontroller	8h
7	Introduction to Fuzzy logic	8h
	Total Hour	**60 h**

Semester – 4	**Module Name: Pneumatics**	**Module Code: CP34402T**
Sl. No.	**Module Details**	**Theory Hours 30**
1	Pneumatic System	4h
2	Compressed Air	4h
3	Basic Pneumatic Components	6h
4	Basic Pneumatic Circuits	10h
5	Pneumatic Hand Tools	4h
6	Familiarization of Pneumatic system and Equipment at the industry	2h
	Total Hour	**30 h**

Semester – 4	**Module Name: Programmable Logic Controller**	**Module Code: CP34403T**
Sl. No.	**Module Details**	**Theory Hours 45**
1	PLC Basics	2h
2	Basic Programming	8h
3	PLC Basic Function	9h
4	Intermediate Function	8h
5	Data Handling Function	8h
6	Application	10h
	Total Hour	**45 h**

Semester – 4	**Module Name: Quality Management Systems**	**Module Code: CP34404T**
Sl. No.	**Module Details**	**Theory Hours 30**
1	Introduction to Quality	2h
2	Core Tools	4h
3	Quality circles, 7 QC tools	4h
4	Handling Non – Conformance	2h
5	Root Cause and Corrective Action (RCCA)	2h
6	TQM	8h
7	Inspection	3h

8	FOD	3h
9	Lean Management	2h
	Total Hour	**30 h**

Semester – 4	**Module Name: Manufacturing Engineering – Elective (Industry Specific)**	**Module Code: CP34405T**
Sl. No.	**Module Details**	**Theory Hours 45**
1	Safety	2h
2	Hand Tools	6h
3	Drilling	6h
4	Linear Measurements	4h
5	Angular Measurement	4h
6	Gauges	6h
7	Introduction to Limits and Fits	6h
8	Techniques to be adopted for reducing Cycle Time	5h
9	Production and Productivity Management	6h
	Total Hour	**45 h**

Semester – 4	**Module Name: Wire Harness - Types, Specification and Standards – Elective (Industry Specific) Module Code: CP34406T**	
Sl. No.	**Module Details**	**Theory Hours 45**
1	Adhesives and Sealants	3h
2	Adapters	6h
3	Cable Assemblies	6h
4	Cable Feed throughs	4h
5	Shipboard Electrical Splice Kits (SESK)	4h
6	Ship or Shore - Breakout kits	4h
7	Electrical Interconnect Components	4h
8	Data Bus Components	4h
9	Connectors	10h
	Total Hour	**45 h**

Semester – 4	**Module Name: Microcontroller and Applications Lab**	**Module Code: CP34407P**
Ex. No.	**Module Details**	**Practical Hours 15**
1	Familiarization of 8051 Microcontroller	1h
2	Basics programming of 8051 Microcontroller	6h
3	Familiarization of PIC Microcontroller	2h

4	Application of Microcontroller in Automobiles / Industry – Interfacing Sensor, Display Devices, Assembly line	6h
	Total Hour	**15 h**

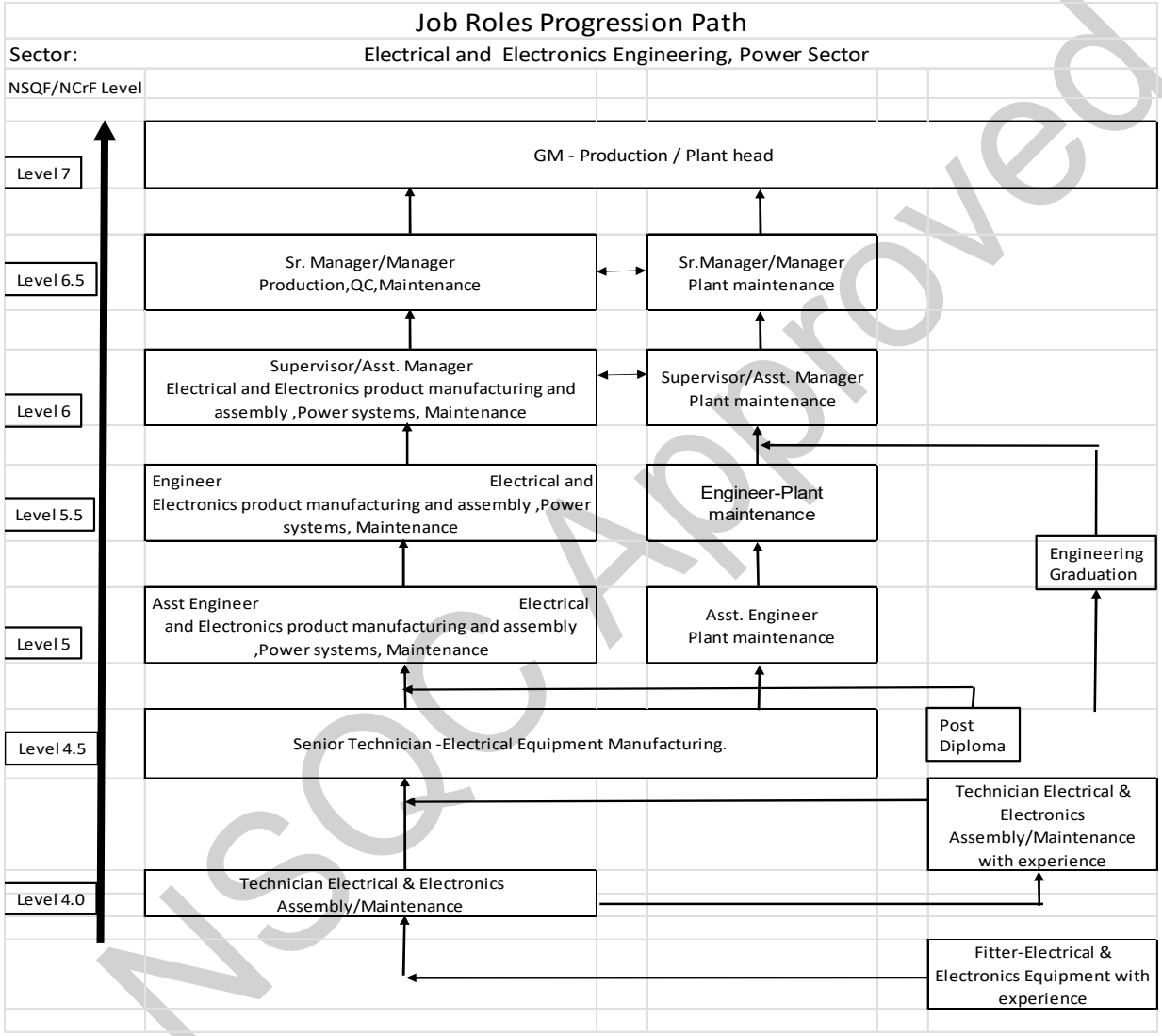
Semester – 4	**Module Name: PLC Lab**	**Module Code: CP34408P**
Ex. No.	**Module Details**	**Practical Hours 30**
1	Familiarization of PLC System	6h
2	Familiarization of Basics Function	10h
3	Basic Logic Function	6h
4	Basics of Timer and Counter	8h
	Total Hour	**30 h**

Semester – 4	**Module Name: Pneumatics Lab**	**Module Code: CP34409P**
Ex. No.	**Module Details**	**Practical Hours 30**
1	Familiarization of the following: Compressor and its parts, Air driers, FRL unit, Single acting and double acting cylinder, Direction control valve, Flow control valve,	10h
2	Pressure control valve Simulation of basic Pneumatic circuits	10h
3	Rigging of basic Pneumatic circuits	10h
	Total Hour	**30 h**

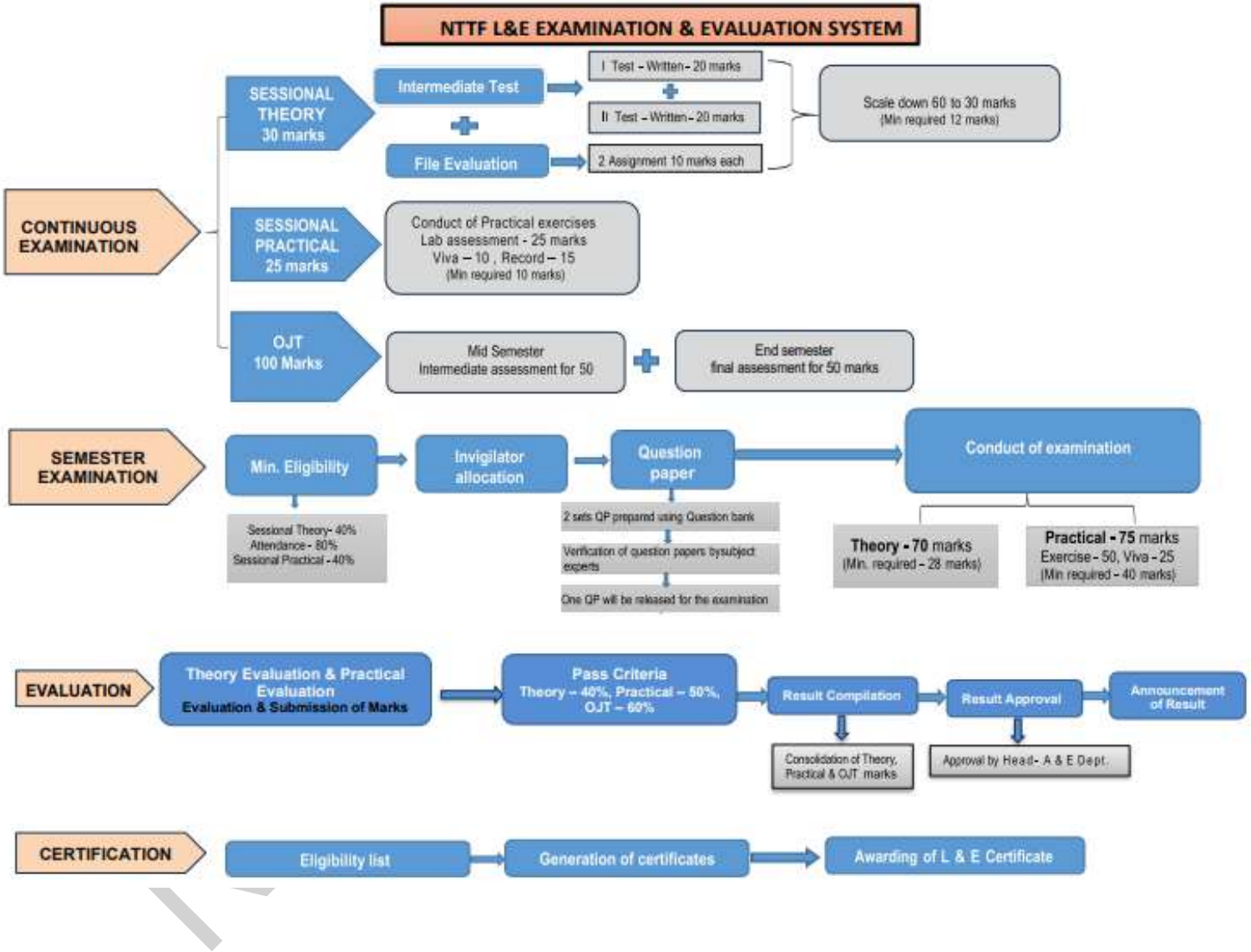
Semester – 4	**Module Name: OJT**	**Module Code: CP34410P**
Sl. No.	**Module Details**	**Practice Hours 285**
1	On the Job Training in the relevant sector	285 h
	Total Hours	**285 h**

Semester - 4	**Module Name: Employability Skills**	**Module Code: CP34411T**
Sl. No.	**Module Details**	**Theory Hours 30**
1	Financial and Legal Literacy	9h
2	Occupation safety, Health, and Environment education	9h
3	Digital Literacy Skills	7h
4	Essential skills for success	5h
	Total Hours	**30 h**

Annexure 9: Career Progression



Annexure 10: Assessment SOP



Annexure 11: Occupational Map
Sector Name: Electrical and Electronics

As per NCrF		As per NCO-2015	Sub-Sector 1/Electrical and Electronics Equipment manufacturing, and Maintenance	
NCrF Level (1-7)	**Level Descriptors**	**NCO-15 -- Family (First 4 digits code/s for the given level cross cutting the OM Sub-Sectors/Occupations)**	**Occupation** 1/Manufacturing	**Occupation 2/ Electrical and Electronics maintenance**
Level 7	**1.** Professional Theoretical Knowledge: **Advanced knowledge with critical understanding of emerging developments** **2.** Professional and Technical Skills/ Expertise: **Highly specialized skills, transdisciplinary skills, leadership skills** **3.** Employment Readiness & Entrepreneurship Skills & Mind-set: **Cross cultural competency, transformational leadership** **4.** Broad Learning Outcomes: **Apply acquired advanced technical skills, technical appraisal and reviews** **5.** Responsibility: **Business Management (like/ CEO / CXO, etc.)**	1321	GM -Production/ Plant Head	GM -Production/ Plant Head
Level 6.5	**1.** Professional Theoretical Knowledge: A**dvanced multidisciplinary and specialized knowledge** **2.** Professional and Technical Skills/ Expertise: A**dvanced Technical and Managerial Skills** **3.** Employment Readiness & Entrepreneurship Skills & Mind-set: **Leadership, effective resource management** **4.** Broad Learning Outcomes: **Judgement in complex problems** **5.** Responsibility: **Vertical/ Business unit management –Manager or Senior Manager**	1321	Sr. Manager/Manager Production, QC, Maintenance	Sr. Manager/Manager Plant maintenance

Level 6	**1.** Professional Theoretical Knowledge: **Multidisciplinary and specialized knowledge** **2.** Professional and Technical Skills/ Expertise: **Range of skills along with specialized domain skills** **3.** Employment Readiness & Entrepreneurship Skills & Mind-set: **Entrepreneurial mindset, self-management** **4.** Broad Learning Outcomes: **Judgement / decision making – specialized** **5.** Responsibility: **Team leader – Junior technical supervisor, technical supervisor or junior/ deputy manager**	3122	Supervisor/Asst. Manager Electrical and Electronics product manufacturing and assembly, Power systems, Maintenance	Supervisor/Asst. Manager Plant maintenance
Level 5.5	**1.** Professional Theoretical Knowledge: **Specialized knowledge** **2.** Professional and Technical Skills/ Expertise: **Specialized skills** **3**. Employment Readiness & Entrepreneurship Skills & Mind-set: **Team readiness, self-entrepreneurship readiness** **4.** Broad Learning Outcomes: **Specialized/ complex jobs/tasks** **5**. Responsibility: **Self and team responsibility – Master Technician**	3122	Engineer Electrical and Electronics product manufacturing and assembly, Power systems, Maintenance	Engineer-Plant maintenance
Level 5		3113 3114	Asst. Engineer Electrical and Electronics product manufacturing and assembly ,Power systems, Maintenance	Asst. Engineer Plant maintenance
Level 4.5	**1.** Professional Theoretical Knowledge: **Range of knowledge** **2.** Professional and Technical Skills/ Expertise: **Range of technical skills** **3.** Employment Readiness & Entrepreneurship Skills & Mind-set: **Team readiness & Entrepreneurial readiness** **4.** Broad Learning Outcomes: **Carry out Range of tasks and may provide range of solutions** **5**. Responsibility: **Accountable/ responsible – Sr. Technician/Jr.Engineer**	3113 3114	Senior Technician Electrical and Electronics Installation, Assembly of electrical /electronic systems of equipment and machinery. Power Systems, Testing. Power generation.	Senior Technician Electrical and Electronics Electives - Installation, Maintenance of electrical /electronic systems of equipment and machinery. Power generation equipment maintenance

Level 4.0	**1. Professional Theoretical Knowledge: Range of knowledge** **2. Professional and Technical Skills/ Expertise: Range of technical skills** **3. Employment Readiness & Entrepreneurship Skills & Mind-set: Work in a team-Follow instructions** **4. Broad Learning Outcomes: Carry out Range of tasks with minimum supervision** **5. Responsibility: Follow instructions - Jr. Technician/Technician**	3113 3114	Technician-Industrial Electrical. Cable laying, Wire loom designer, Panel board assembler and tester Assembly & Fitting	Technician-Industrial Electrical. Cable laying and maintenance Panel board tester and maintenance. Diagnosis of electrical faults

Annexure 12: Key Learning Outcome

SL. NO.	MODULE NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL & PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
		SECOND YEAR		
15	**Industrial Electronics (CP34301T)** **Industrial Electronics Lab (CP34308P)** Understanding on Power devices and power protection devices.	Understanding of construction and working of various motors. Power semiconductor devices. Knowledge on Electromechanical devices.	Construction and working of Inverters, power supplies, UPS. Basics of PCB. Handling Electronic components.	Identifying protective devices. Motors. PCB fabrication process.
16	**Digital Electronics (CP34302T)** **Digital Electronics Lab (CP34307P)** Application of simple logical circuits in the work area.	Understanding on Number systems and code conversions. Understanding on Logical gates and its operations. Knowledge on types of Memory.	Universal properties of NAND and NOR gates. Reducing logical equations using Boolean algebra and other techniques. Working of combinational and sequential circuits, Latches and Flip-Flops. Rig circuits for Multiplexers, demultiplexers, half adder, full adders.	Application of logical gates, combinational and sequential logics, latches, memories, Adders, Mux and De-mux for control of small processes in industry.
17	**Material Technology (CP34303T)** Understanding on various metal alloys and plastics for industrial applications.	Understanding of various Engineering materials (Ferrous, Nonferrous, plastics.	Explain properties, application of different materials.	Apply different materials as conductors, insulators.

18	**Sensors and Transducers (CP34304T)** **Sensors and Transducers Lab (CP34309P)** Applications of various sensors and Transducers	Knowledge and understanding on construction and working of mechanical, electrical and proximity sensors. Understanding on feedback elements.	Explain the working principle of various sensors and transducers.	Identification and specification of Mechanical, Electrical, proximity sensors and transducers.
19	**Assembling and testing of products (CP34305T)-Elective** Perform the process crimping connections and connector assembly.	Understand the process of cable preparation, crimping, connecting and harness identification, connector mating and inspection.	Stripping, crimping, connector assembly process.	Perform the harness assembly, identify test and inspect harness.
20	**Soldering Techniques (CP34306T) – Elective** Explain the types of PCB, components, temperature characteristics, Through Hole Technology and SMT.	Knowledge and understanding on PCB materials, types of PCBs, Components. Temperature characteristics of solder material. Various technology of PCBs.	Identify components, prepare components. Determine the temperature required for the soldering and desoldering processes and the technology associated with the assembly process.	PBC mounting, soldering of through hole components and SMD in the industry.
21	**Microcontrollers and Applications – (CP34401T)** **Microcontrollers and Applications Lab – (CP34407P)** Write simple programs using 8051 and PIC Microcontrollers.	Understanding on the architecture and programming of 8051 and other PIC microcontrollers. Knowledge on fuzzy logics.	Interfacing 8051 with other peripherals. Interfacing sensors and display devices.	Application of 8051 in their work area.
22	**Pneumatics (CP34402T)** **Pneumatics lab (CP34409P)** Basic understanding on pneumatic components, circuits.	Understanding operation of compressed air.	Identifying pneumatic components. Rig simple pneumatic circuits. Identify pneumatic hand tools.	Identify pneumatic components, rig and trouble shoot small simple pneumatic circuits.

23	**Programmable Logic Controller – (CP34403T)** **PLC lab (CP34408P)** Simple programs using PLC to interface timers and counters.	Knowledge and understanding of basic PLC.	Write simple ladder diagrams for controlling input output components. Intermediate and data handling functions. Interfacing Timers and counters.	Write programs for small simple logic circuits for industrial applications and trouble shoot control circuits.
24	**Quality Management Systems (CP34404T)** Understand different aspects, tools of QC.	Understand quality. Quality circles and core tools of quality.	Explain - Handling non-conformance. TQM Lean management.	Adopt 7 QC Tools to solve real time problems. RCCA Inspection FOD
25	**Manufacturing Engineering (CP34405T) – Elective** Practice various measurements, cycle time reduction and productivity management techniques in work area.	Understanding Linear measurement and Angular Measurements. Limits and fits.	Identify various hand tools, Drilling process. Use of Gauges, limits and fits.	Use measuring techniques (Linear and angular), gauges in work area. Practice TPM techniques, techniques for reducing cycle time.
26	**Wire harness – Types, Specification and Standards. – (CP34406T) - Elective** Use different techniques to for manufacturing harness, connectors, and sealants.	Knowledge on Adhesives and sealants, Adapters.	Electrical interconnect components. Data bus components. Identify different connectors.	Perform cable assemblies, cable feed throughs. Shipboard electrical splice kits. Ship or Shore breakout kits
27	**OJT (CP34310P)** **OJT (CP34410P)**			On the Job Training in the relevant sector

28	**Employability Skills (CP34311T) (CP34411T)** Understand Entrepreneurship skills Ability to understand financial and legal aspects Understand Occupation safety, Health, and Environment related issues. Ability to use Essential skills.	Knowledge on various schemes and institutions promoting Entrepreneurs. Ways of setting enterprise, legal compliances, marketing, and budgeting etc. Knowledge and understanding on personal finance management, investments, returns, basics of taxes, awareness on financial frauds and prevention. Awareness on fundamental rights under the constitution and facilities available for recourse in the event of breach. Knowledge on Occupation safety and health, at workplace, Occupation Hazards, Accident prevention and PPEs, Environment, Pollution and protection of environment, Energy conservation, Global warming, Conservation of natural resources, waste management and disposal, Disaster Management. Understanding balancing Life and Career, Value based decision making, Types of stress and stress management.	Explain the schemes promoted by various support institutions. Budgeting and evaluations. Explain the Occupations hazards and process of mitigation of such hazards. PPEs. Explain environment conservation, and other factors affecting them.	Apply and impart details to other people in society. Decide, plan and implement various financial management ideas, taxations and benefits and legal compliance in the workplace. Enforce caution against financial frauds and addressal of frauds. Follow all safety norms laid by the industry to develop a safe workplace. Practice stress management techniques to ensure high productivity in the work area.

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