



QUALIFICATION FILE

Senior Technician-Electrical Equipment Manufacturing

- ☐ 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: 4.5

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	Senior Technician-Electrical Equipment Manufacturing	
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: Senior technician-Electrical Equipment Manufacturing
4.	a. OEM Name b. Qualification Name (Wherever applicable)	NA	
5.	National Qualification Register (NQR) Code & Version (Will be issued after NSQC approval)	QG-4.5-EH-01400-2023-V1-NTTF	6. NCrF/NSQF Level: 4.5
7.	Award (Certificate/Diploma/Advance Diploma/ Any Other) (Wherever applicable specify multiple entry/exits & provide details in annexure)	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. The Candidate will have exposure on Electrical and Electronic, Power circuits, PCB Technology, Microcontrollers, PLC, Pneumatics, Robotics and IOT and Industry 4.0. The subjects covered in this programme are – Mechanical and Electrical Drives, Safety Health and Environment, Introduction to Robotics, Connector Manufacturing, PCB Technology, Starter Motor Technology, Testing of wire harness, UPS Technology, Assembly Techniques, Advanced Wire Harness Manufacturing, Introduction to IoT and Industry 4.0, Production Management, Industrial Management, Electrical Equipment Maintenance, Professional Ethics, Connector Assembly, Automation in Manufacturing, Employability Skills, Robotics Lab, Wire harness testing lab, IoT Lab, Project/Case Study, OJT	

9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience:					
		Sl. No.	Academic/Skill Qualification (with Specialization - if applicable)				Required Experience (with Specialization)
		1	Advanced Certificate - Technician Electrical and Electronics Assembly Level 4.0 from NTTF				NA
10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	Total Credits – 40			11. Common Cost Norm Category (I/II/III) (Wherever applicable): NA		
12.	Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)	NA					
13.	Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)	☐ Offline ☐ Online ☒ Blended					
		Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)
		Classroom (offline)	295	105	615		1015
		Online	185				185
		(Refer Blended Learning Annexure for details)					
14.	Aligned to NCO/ISCO Code/s (if no code is available mention the same)	NCO Code –2015/3113.0101, 2015/3114.0100					
15.	Progression path after attaining the qualification. (Please show Professional and Academic progression)	Professional Progression: 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: 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: Engineer - Supervisor – Manager - General Manager - Entrepreneur	
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 Industrial Management Module Code: CP34603T	
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: nttftg.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					
						Th.	Pr.	OJT-Man	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
Semester – 5																
1	Introduction to Robotics	CP34501T	Core	4.5	20	30	-	-	-	30	100	-	-	-	100	
2	Mechanical and Electrical Drives	CP34502T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
3	Safety Health and Environment	CP34503T	Core	4.5		30	-	-	-	30	100	-	-	-	100	
4	Connector Manufacturing	CP34504T	Core	4.5		30	-	-	-	30	100	-	-	-	100	
5	Elective - 9/10/11 (Choose One)	CP3450X*T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
6	Elective -12/13/14 (Choose One)	CP3450Y*T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
7	Robotics Lab	CP34511P	Core	4.5		-	15	-	-	15	-	75	-	25	100	
8	Wire harness testing lab	CP34512P	Core	4.5		-	30	-	-	30	-	75	-	25	100	
9	OJT	CP34513P	Core	4.5		-	-	300	-	300	-	75	-	25	100	
10	Employability Skills	CP34514T	Core	4.5		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					20	255	45	300	-	600	675	225	-	100	1000	
Semester – 6																
1	Introduction to IoT and Industry 4.0	CP34601T	Core	4.5	20	30	-	-	-	30	100	-	-	-	100	
2	Production Management	CP34602T	Core	4.5		30	-	-	-	30	100	-	-	-	100	
3	Industrial Management	CP34603T	Core	4.5		30	-	-	-	30	100	-	-	-	100	
4	Industrial Maintenance	CP34604T	Core	4.5		30	-	-	-	30	100	-	-	-	100	
5	Professional Ethics	CP34605T	Core	4.5		30	-	-	-	30	100	-	-	-	100	
6	Elective - 15/16 (Choose one)	CP3460X*T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
7	IoT Lab	CP34608P	Core	4.5		-	15	-	-	15	-	75	-	25	100	
8	Project/Case Study	CP34609P	Core	4.5		-	45	-	-	45	-	75	-	25	100	
9	OJT	CP34610P	Core	4.5		-	-	315	-	315	-	75	-	25	100	
10	Employability Skills	CP34611T	Core	4.5		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					20	225	60	315	-	600	675	225	-	100	1000	
Total for 1-year Programme					40	480	105	615	-	1200	1350	450	-	200	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 – 5 (Elective NOS/s: Elective 9/10/11 (CP3450X*T) and Elective12/13/14 (CP3450Y*T))																
9	PCB Technology	CP34505T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
10	Starter Motor Technology	CP34506T														
11	Testing of wire harness	CP34507T														
12	UPS Technology	CP34508T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
13	Product Assembly Techniques	CP34509T														
14	Advanced Wire Harness Manufacturing	CP34510T														
Semester - 6 (Elective NOS/s: Elective 15/16 (CP3460X*T))																
15	Automation in Manufacturing	CP34606T	Core	4.5		45	-	-	-	45	100	-	-	-	100	
16	Connector Assembly	CP34607T														

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	Identify, Develop, analyse, Integrate and Troubleshoot Embedded and Power Systems for Industrial applications. State the parts of a Robot. Describe the ISO procedures for Environment, Health and safety. Explain the processes of Connector Manufacturing Describe different mechanics, drives and maintenance procedures. Explain the Parts and Functions of Starter Motor. List types of UPS and its applications.	Job Holder Can Design, Fabricate, Validate and Trouble shoot Electronics, Power Circuits and Embedded Systems. Job Holder Understand Safety and Health aspects and Ensures Compliance with Health and Safety Regulations. Identify the parts and motions of a Robot Interpret Connector Manufacturing process Maintenance of mechanics and drives of equipments in industry. Follow the Assembly procedure of Starter Motors. Select the appropriate UPS as per Parameters.	4.5
Professional and Technical Skills/ Expertise/ Professional Knowledge	Specify and Use Electrical and Electronics Components and Equipment Develop, simulate and verify Mechanical, Electrical, Electronic, Pneumatic circuit and systems. Ability to use Microcontrollers, Embedded systems programming, PLC and Pneumatics Equipment, to develop and control Automation Processes. Explain Mechanical Drive systems, Control Electrical Drives and Systems. Demonstrate Professional Knowledge of Industry 4.0.	Trouble and maintain Electrical, Electronic Component/Equipment and their Appliances in the Industry. Will have Knowledge of Process Planning in an industry. Develop systems and programs to control by integrating to automate industry processes. Can organize work and perform tasks by self and as Team Develop and troubleshoot IoT based systems	4.5

	Will have Capability to organize and perform by self and/or work with others in the above areas. Can analyze Data situations and take appropriate decisions. Describe Io T. Explain the requirements and test procedures of Wire harness	Develop the Quality test charts and implement the Quality Assurance	
Employment Readiness & Entrepreneurship Skills & Mind - set/Professional Skill	Able to communicate Effectively with Peers and Supervisors in the work area. Good Knowledge on Organization, ethical & moral values, and Practice Time Management Able to Analyze solutions Critically and Logically for fine decision making. Able to work Effectively in a Team and lead a Team. Knowledge of the latest Technologies and Industrial Trends. Will have good Ingenuity and Creativity. Will have good Leadership Skills and have an entrepreneurial for small start-up.	Good Communication with Peers, superiors both verbal and written, Good on Presentation Skills, QC, 5S and KAIZEN. Can Analyze situations Critically and Logically. Adopt latest Technologies emerging in the Domain. Can lead a group to work Effectively. Can solve, adopt to new Situations Creatively.	4.5
Broad Learning Outcomes/Core Skill	Explain the assembling, mounting, soldering techniques in an assembly line. Describe Mechanical Drive systems, Control Electrical Drives and Systems. Perform programming of Robot and its applications.	Application of skills in the Electrical/ Electronic assembly for manufacturing. Perform operations and programming of Robot Develop and troubleshoot IoT based systems Will follow all safety norms and standard operating Procedures in the work area.	4.5

	Proficiency in programming and development of IoT based systems Safety and standard operating Procedures and Practices in the work area. Communicate with Peers and Superiors. Critical Thinking, Creativity and Logical thinking. Data collection, analysis, decision making ability. Solve problems using QC tools and contribute for Kaizen in the work areas. Knowledge on effective 5S, TPM and TQM activities.	Verbal and written communication, computer literacy. Maintain Good Relationship with Peers and Superiors and Will be able to Win Good will and Trust of Peers. Analyze Critical problems in work area and real life. Decision Making ability. Process improvement and problem-solving skills.	
Responsibility	Aware of Personal/Industrial goals Adapt to changes in the work area. Thorough understanding of safety Procedures and SOPs in the relevant work area Supervise, evaluate, and improve the activities of team in the work area.	Able to Carry out Design and Integration of Electronics Systems Under Minimum Supervision. Guide Junior Technicians in Fulfilling Tasks Assigned to them.	4.5

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@lot uspowergear.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.vasu devan@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:

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 – 5					
Introduction to Robotics	Use of Robots, motion controls	10	-	-	-
	Control of end effectors and Machine Vision	10	-	-	-
	Program the Robot	15	-	-	-
	Configure robot for application	10	-	-	-
	Robotic Language and Programming	20	-	-	-
	Robot Application	15	-	-	-
	Knowledge of Robotics	20	-	-	-
Total Marks		100			
Mechanical and Electrical Drives	Knowledge of Mechanical Drives, parts of motor	50	-	-	-
	Operation and control of Electrical Drives	50	-	-	-
	Total Marks	100			
Safety Health and Environment	Use of protective equipment against chemical hazards	30	-	-	-
	Use of first aid kit	15	-	-	-
	Knowledge of ISO 14001 and OHSAS 18001	55	-	-	-
	Total Marks	100			
Connector Manufacturing	Knowledge of Housing Molding	40	-	-	-
	Knowledge of Terminal Stamping and Plating	60	-	-	-
	Total Marks	100			

Elective - I (PCB Technology)	Knowledge of types of Printed Wiring Board & layout	30	-	-	-
	Mounting of circuit components and other hardware	10	-	-	-
	Mounting & soldering of Surface Mount Technology	25	-	-	-
	Designing of PCB using Computers	35	-	-	-
	Total Marks	100			
Elective - I (Starter Motor Technology)	Knowledge of types of Gears and Gear drives	40	-	-	-
	Knowledge of Parts and Functions of Starter Motor and their assembly procedure	60	-	-	-
	Total Marks	100			
Elective - I (Testing of wire harness)	Ability to Test wire harness using test bench	25	-	-	-
	Concept of Product Qualification & make Test Charts	30	-	-	-
	Concept of Quality Assurance	35	-	-	-
	Knowledge of recent Trends in Wire Harness Testing	10	-	-	-
	Total Marks	100			
Elective - II (UPS Technology)	Know parts of UPS and their functions	20	-	-	-
	Knowledge of Major Components and their parameters in UPS	25	-	-	-
	Types of Batteries in UPS	15	-	-	-
	Knowledge of UPS System Architecture	20	-	-	-
	Knowledge of UPS Management and selection of UPS	20	-	-	-
	Total Marks	100			
Elective - II (Assembly Techniques)	Knowledge of Tightening Methods and Process	25	-	-	-
	Assembling of various devices	30	-	-	-
	Specifications of the accessories used in Assembly	30	-	-	-

	Using of gauges and measuring instruments	15	-	-	-
	Total Marks	100			
Elective - II (Advanced Wire Harness Manufacturing)	Knowledge of characteristics and Parameters for Harness Plan	25	-	-	-
	Knowing steps involved in creation of Harness plan	25	-	-	-
	Ability to do Geometric Bundle Analysis	25	-	-	-
	Concept of Harness Flattening	25	-	-	-
	Total Marks	100			
Employability Skills	Essential Skills for Success	20	-	-	5
	Quality Management	20	-	-	5
	Critical thinking and Problem solving	15	-	-	10
	Getting ready for Entrepreneurship	20	-	-	5
	Total Marks	100			
Robotics Lab	Use robot for pick and place, sorting, welding and painting	-	75	-	25
	Total Marks	100			
Wire harness testing lab	Plan and test the given wire harness	-	75	-	25
	Total Marks	100			
OJT	Details of the machines and specifications	-	40	-	10
	Methods adopted to reduce waste	-	35	-	15
	Total Marks	100			
Semester – 6					
Introduction to IoT and Industry 4.0	Knowledge of building blocks of Industry 4.0	30	-	-	-
	Applications of Internet of Things (IOT)	35	-	-	-

	Future Trends in Industry 4.0 and IOT	35	-	-	-
	Total Marks	100			
Production Management	Knowledge of different types of industries and their Layout	30	-	-	-
	Concept of production planning and control & TPM	35	-	-	-
	Implement Inventory Management: Material Purchase, Store etc.	35	-	-	-
	Total Marks	100			
Industrial Management	Parameters for selection of Plant Location / Site, layout	30	-	-	-
	Adopt suitable Production Methods	35	-	-	-
	Knowledge of various types of organisations	35	-	-	-
	Total Marks	100			
Maintenance	Carry out suitable Maintenance Function	20	-	-	-
	Knowledge of Types of Maintenance: Lubrication, Surface Protection, Belt and Chain Drives, Conveyors, Gears and Gear drives	45	-	-	-
	Maintenance of Pneumatic and Electrical Equipment	35	-	-	-
	Total Marks	100			
Professional Ethics	Demonstrate good Ethics, Cultures and Values	60	-	-	-
	Methods and Motivation to improve Work Ethics	40	-	-	-
	Total Marks	100			
Elective (Automation in Manufacturing)	Implement Automation in Material Handling	45	-	-	-
	Analyze and automate Assembly Line	55	-	-	-
	Total Marks	100			
Elective (Connector Assembly)	Ability to strip Insulation from Conductors Cable, and Crimp, assemble Connector	75	-	-	-

	Identify the Harness	25	-	-	-
	Total Marks	100			
Employability Skills	Labour Welfare and Legislation	20	-	-	5
	Customer Interaction/ Service	15	-	-	10
	Conflict resolution and Negotiation	20	-	-	5
	Job readiness	20	-	-	5
	Total Marks	100			
IoT Lab	Analyse the IOT setup	-	25	-	10
	Analyse the IOT data	-	50	-	15
	Total Marks	100			
Project / Case Study	Analyse given data, define problem, and suggest solutions.	-	35	-	-
	Implement solution and analyse the results	-	40	-	25
	Total Marks	100			
OJT	Analyse the IOT implemented	-	55	-	15
	Suggest solutions to improve	-	20	-	10
	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:

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

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

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.nttfrg.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 White Board

CCTV Camera

Pen Drive

Video Conferencing

Biometric

Edusquare: NTTF ERP/CRM used for academic purpose Edusquare erp.nttfrg.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.nttfrg.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 – 5		Module Name: Introduction to Robotics	Module Code: CP34501T
Sl. No.	Module Details	Theory Hours 30	
1	Introduction to Robotics	4h	
2	Robot motion	6h	
3	End effectors	6h	
4	Machine Vision	6h	
5	Robotic Language and Programming	6h	
6	Robot Application	2h	
		Total Hour	30 h

Semester – 5		Module Name: Mechanical and Electrical Drives	Module Code: CP34502T
Sl. No.	Module Details	Theory Hours 45	
1	Mechanical Drives	16h	
2	Motors	12h	
3	Electrical Drives	17h	
		Total Hour	45 h

Semester – 5		Module Name: Safety Health and Environment	Module Code: CP34503T
Sl. No.	Module Details	Theory Hours 30	
1	Safety	6h	
2	Health	8h	
3	Environment	8h	
4	Introduction to ISO 14001 and OHSAS 18001	8h	
		Total Hour	30 h

Semester – 5		Module Name: Connector Manufacturing	Module Code: CP34504T
Sl. No.	Module Details		Theory Hours 30
1	Introduction		4h
2	Housing Molding		6h
3	Terminal Stamping		8h
4	Terminal Plating		12h
	Total Hour		30 h

Semester – 5		Module Name: PCB Technology Elective (Industry Specific)	Module Code: CP34505T
Sl. No.	Module Details		Theory Hours 45
1	Introduction to connectivity		2h
2	Types of Printed Wiring Board		6h
3	Circuit components and Hardware		9h
4	Surface Mount Technology		8h
5	Layout Planning		10h
6	Automation and Computers in PCB		10h
	Total Hour		45 h

Semester – 5		Module Name: Starter Motor Technology Elective (Industry Specific)	Module Code: CP34506T
Sl. No.	Module Details		Theory Hours 45
1	Introduction		6h
2	Gears		8h
3	Gear Drives		8h
4	Parts and Functions of Starter Motor		14h
5	Assembly procedure of Starter Motors		9h
	Total Hour		45 h

Semester – 5		Module Name: Testing of wire harness Elective (Industry Specific)	Module Code: CP34507T
Sl. No.	Module Details		Theory Hours 45
1	Introduction to Testing		4h
2	Requirements for Testing		7h
3	Test Bench		6h
4	Product Qualification / Test Charts		8h
5	General methods for Product qualification		8h
6	Quality Assurance		6h
7	Recent Trends in Wire Harness Testing		6h
	Total Hour		45 h

Semester – 5		Module Name: UPS Technology -Elective 2 (Industry Specific)	Module Code: CP34508T
Sl. No.	Module Details		Theory Hours 45
1	Introduction		2h
2	Types of UPS and Applications		6h
3	UPS Major Components		10h
4	Batteries in UPS		8h
5	Parameters for choosing UPS		4h
6	System Architecture		8h
7	UPS Management and communication		7h
	Total Hour		45 h

Semester – 5		Module Name: Product Assembly Techniques Elective 2	Module Code: CP34509T
Sl. No.	Module Details		Theory Hours 45
1	Introduction		2h
2	Tightening Methods and Process		8h

3	Assembly - Understanding Solving	8h
4	Organizational Knowledge	8h
5	Accessories used in Assembly	5h
6	Gauges and Measuring Instruments	8h
7	Documentation – SEG	6h
	Total Hour	45 h

Semester – 5 Module Name: Advanced Wire Harness Manufacturing Elective 2 (Industry Specific) Module Code: CP34510T		
Sl. No.	Module Details	Theory Hours 45
1	Characteristics of Wire Harness	6h
2	Parameters for Harness Plan	4h
3	Understanding steps involved in creation of Harness plan	10h
4	Geometric Bundle Analysis	10h
5	Harness Flattening	4h
6	Application of Wire Harness	2h
7	Harness Planning Procedure at Deutsch	9h
	Total Hour	45 h

Semester – 5 Module Name: Robotics Lab Module Code: CP34511P		
Ex. No.	Module Details	Practical Hours 15
1	Pick and Place	3h
2	Sorting	4h
3	Welding	4h
4	Painting	4h
	Total Hour	15 h

Semester – 6			Module Name: Introduction to IoT and Industry 4.0			Module Code: CP34601T		
Sl. No.	Module Details						Theory Hours 30	
1	Introduction to Industry 4.0						6h	

2	Building Blocks of Industry 4.0	8h
3	Internet of Things (IOT)	10h
4	Future Trends in Industry 4.0 and IOT	6h
Total Hour		30 h

Semester – 6 Module Name: Production Management Module Code: CP34602T		
Sl. No.	Module Details	Theory Hours 30
1	Types of Manufacturing Industry	4h
2	Layout	6h
3	Production Planning and Control	7h
4	Material, Purchase, Store, and Inventory Management	6h
5	TPM	7h
Total Hour		30 h

Semester – 6 Module Name: Industrial Management Module Code: CP34603T		
Sl. No.	Module Details	Theory Hours 30
1	Selection of Plant Location / Site	3h
2	Plant Layout	3h
3	Production Methods	5h
4	Types of Organization	4h
5	Leadership	5h
6	Motivation	5h
7	Industrial Acts	5h
Total Hour		30 h

Semester – 6 Module Name: Industrial Maintenance Module Code: CP34604T		
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Sl. No.	Module Details	Theory Hours 30
1	Importance of Maintenance Function In an Industry	1h
2	Types of Maintenance	4h
3	Lubrication	3h
4	Surface Protection	3h
5	Belt and Chain Drives	4h
6	Gears and Gear drives	4h
7	Conveyors	3h
8	Maintenance of Pneumatic equipment	4h
9	Maintenance of Electrical equipment	4h
	Total Hour	30 h

Semester – 6		Module Name: Professional Ethics	Module Code: CP34605T
Sl. No.	Module Details	Theory Hours 30	
1	Introduction to Ethics, Cultures and Values	3h	
2	Importance of Good Work Ethic	4h	
3	Positive Work Ethics	4h	
4	Importance of Ethics	3h	
5	Five Characteristics of Good Work Ethics	4h	
6	Developing Strong Work Ethic	4h	
7	Professionalism and Work Ethic	4h	
8	Motivation to improve Work Ethics	4h	
	Total Hour	30 h	

Semester – 6		Module Name: Automation in Manufacturing (Elective)	Module Code: CP34606T
Sl. No.	Module Details	Theory Hours 45	
1	Introduction to Automation	10h	
2	Material Handling	10h	
3	Manual Assembly Line	10h	

4	Automated Assembly System	15h
Total Hour		45 h

Semester – 6		Module Name: Connector Assembly (Elective)	Module Code: CP34607T
Sl. No.	Module Details	Theory Hours 45	
1	Stripping Insulation from Conductors Cable	8h	
2	Crimp Connections	8h	
3	Connector Assembly	10h	
4	Harness Identification	10h	
5	Familiarization of Connector Assembly Procedure at Industry	9h	
Total Hour		45 h	

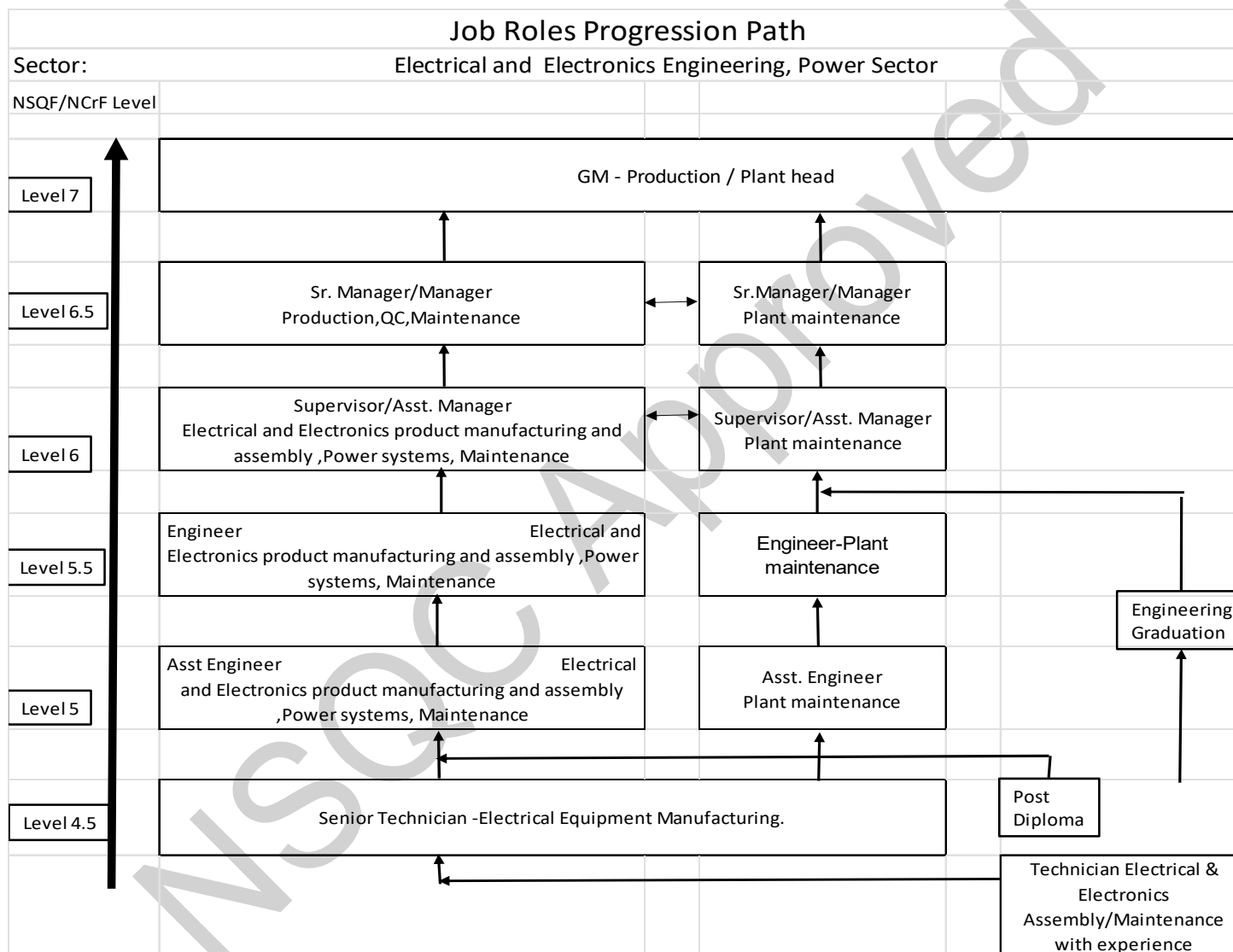
Semester – 6		Module Name: IoT Lab	Module Code: CP34608P
Ex. No.	Module Details	Practical Hours 15	
1	Familiarization on Basic elements of IOT	6h	
2	Hands on practice on Implementation of IOT	9h	
Total Hour		15 h	

Semester – 6		Module Name: Project / Case Study	Module Code: CP34609P
Sl. No.	Module Details	Practical Hours 45	
1	Project / Case Study	45h	
	A group of (3 to 4) students shall do Project / Case Study in their work area under the guidance of faculty and an executive from the work area.		
2	The Project / Case Study to bring out the application of learning's across semesters.		
	Project / Case Study Execution -		
	Steps for Project / Case Study Execution		
	Scope		
2	Data collection		
	Analysis of data		
	Cause identification		
2	Development of solutions		
	Evaluation of solutions and selection of best solution		

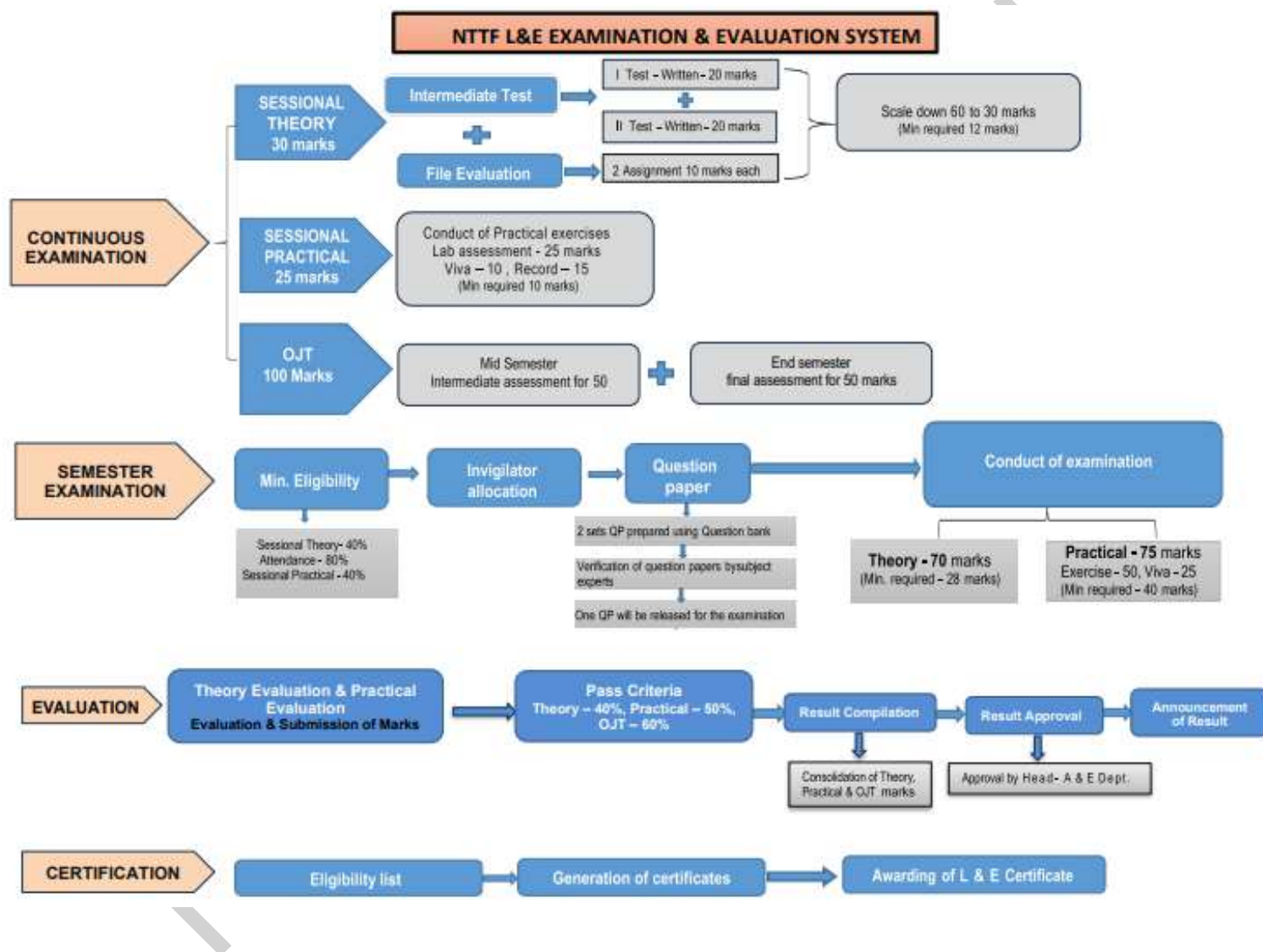
	Implementation of solution Evaluation of results Standardization and Documentation of solution	
3	Project / Case Study Report – Project / Case Study Report structured as under Selection of the Project / Case Study Data collection & Analysis Development of solution, trials & implementation Standardization Benefits of the Project / Case Study Presentation	
4	Project / Case Study Evaluation – Project / Case Study Evaluated on the following Results achieved Application of learning & knowledge acquired Quality of presentation - Data, visuals	

Semester – 6		Module Name: OJT	Module Code: CP34610P
Sl. No	Module Details		Practice Hours 315
1	On the Job Training in the relevant sector		315 h
	Total Hours		315 h

Semester - 6		Module Name: Employability Skills	Module Code: CP34611T
Sl. No.	Module Details		Theory Hours 30
1	Labour Welfare and Legislation.		7h
2	Customer Interaction/ Service.		8h
3	Conflict resolution and Negotiation		8h
4	Job readiness and Exam Preparation		7h
	Total Hours		30 h

Annexure 9: Career Progression

Annexure 10: Assessment SOP



Annexure 11: Occupational Map**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 7.0	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: Advanced multidisciplinary and specialized knowledge 2. Professional and Technical Skills/ Expertise: Advanced 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	13'21	Sr. Manager/Manager Production, QC, Maintenance	Sr. Manager/Manager Plant maintenance

Level 6.0	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	3122	Engineer Electrical and Electronics product manufacturing and assembly, Power systems, Maintenance	Engineer-Plant maintenance
Level 5.0	4. Broad Learning Outcomes: Specialized/ complex jobs/tasks 5. Responsibility: Self and team responsibility – Asst. Engineer or Master Technician	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. Manufacturing & Assembly	Senior Technician Electrical and Electronics Electives - Installation, Maintenance of electrical /electronic systems of equipment and machinery. Power generation equipment maintenance

Annexure 12: Key Learning Outcome

SL. NO.	MODULE NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL & PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
THIRD YEAR				
29	Introduction to Robotics. (CP34501T) Robotics Lab (CP34511P) Program a robot using teach box.	Knowledge on Robot Anatomy.	Collect relevant information to Programme robot via teach box, software. Explain the working of various robot applications in the industry.	Programme robot via teach box, software. Test functionality
30	Mechanical and Electrical Drives – (CP34502T) Identify the drive type and its maintenance procedure.	Knowledge and understanding on the need for Lubricants, Belts Drives, Chain Drives, Gears and Gear Drives. Knowledge on Bearings, Couplings.	Applications of drives and bearings. Construction and working of DC and Induction Motors.	Lubricate, select Bearings and Drives for industrial applications.
31	Safety Health and Environment – (CP34503T) Awareness on Environmental safety, Health, ISO and OHSAS.	Understand Health Hazards and Controlling Methods. Explain various pollution, (Air, Water, and Noise and Controlling Methods. Knowledge on ISO 14001 and OHSAS 18001.	Understand the need of recording and investigating Accidents. Explain Energy Saving Methods. Explain methods of disposal of wastes. Explain contribution of wind and solar energy to environment.	Practice personal, shop floor, Electrical and Fire Safety. Use Appropriate PPE, Help in Preventing and Controlling Accidents.
32	Connector Manufacturing – (CP34504T) Connector housing, stamping and plating process knowledge.	Knowledge on moulding materials.	Explain the connector housing moulding, materials, and their advantages.	Terminal stamping and plating process, any defects identification process.
33	PCB Technology (Elective 1) – (CP34505T) PCB Manufacturing process	Knowledge on Hardware and circuit components. Knowledge on types of Printed Wiring Boards.	Design layout planning. Surface mount technology.	Operate Automation and computers in PCB.

34	Starter Motor Technology (Elective 1) (CP34506T) Gears, drives and assembly of starter motors.	Knowledge on Specification and application of different gears, gear drives and bearings.	Identify Gears and Drives. Explain the principle of operation of starter motors, their function in different categories of vehicles in the Automobile sector.	Assembling of starter motors. Identify and describe the function of various parts of the starter motor and assemble the same.
35	Testing of wire harness components (Elective 1) (CP34507T) Wire harness testing Lab (CP34512P) Product qualification and Quality Assurance.	Understanding testing and need. Recent trends on harness testing.	Product qualification and test chart. Test bench management. General methods for product qualification.	Quality Assurance process Observation of Wire Harness Planning, wire connector assembly and wire harness testing methods.
36	UPS Technology (Elective -2) (CP34508T) UPS Management and maintenance.	Understanding on types of UPS and architecture. Major components of UPS.	Applications of UPS. UPS and battery specification.	Choosing of battery for UPS UPS maintenance.
37	Product Assembly Techniques (Elective 2) – (CP34509T) SOPs and safety in the assembly process.	Knowledge and understanding of safety, SOP reporting procedures associated with assembly process in industry. Knowledge on SEG documentation.	Clarity on work instructions and SOPs. To identify and use wires, connectors, adhesives and sealants, gaskets – their specifications.	The safety norms associated with the assembly process, handle different manual and power tools for tightening process. Be able to identify problem associated with assembly and take appropriate actions as per the SOP, comprehend various standards adopted by the industry. Be able to use the gauges and measuring devices associated with the assembling process, the QC processes.

38	Advanced Wire Harness Manufacturing (Elective 2) – (CP34510T) Planning Harness procedure as per the industry needs.	Understanding on the characteristics of wire harness.	Parameters for harness plan and steps involved in harness plan.	Analysis of Geometric bundle, Harness flattening, application of wire harness. Harness plan – specific to industry.
39	Introduction to IoT and Industry 4.0 – (CP34601T) IoT Lab – (CP34608P) Awareness if Industry 4.0 and IoT.	Understand Industrial revolution 1.0 onwards. IoT and Future trends.	Architecture/ Building blocks of I- 4.0. Familiarization of basic elements of IoT.	Components of I-4.0 and applications of IoT. Implementation of IoT.
40	Production Management – (CP34602T) Awareness of various activities associated with industry – layout, production planning, Inventory etc.	Knowledge on types of Industry	Explain the layout, production planning and control.	Plan, manage material inventory and purchase process. Clarity on Total productivity Management.
41	Industrial management – (CP34603T) Awareness on Organization, leadership, motivation, Industrial acts.	Understand various industrial acts for the welfare of employees in an organization. Describe types of Organisations	Describe factors influencing selection of Site. Explain advantages and disadvantages of Process Layout, Product Layout and Fixed Position Layout. Explain Mass Production, Batch Production and Job Order Production.	Leadership Styles and Qualities of Good Leader. Theories of Motivation, awareness of industrial acts.
42	Industrial Maintenance – (CP34604T) Apply maintenance practices in the work area.	Understand maintenance and its need in the industry. Understand methods of maintenance in industry.	Comprehend and explain, types of maintenance, activities in maintenance. Maintenance of drives and drive chains.	Maintenance of Pneumatic and electrical Equipments in industry. Lubrication, surface protection procedures.
43	Professional Ethics – (CP34605T)	Understand Ethics, culture and Values. Importance of work ethics,	Positive work ethics. Describe 5 characteristics of good work	Professionalism and work ethics. Motivation to improve worth ethics.

	Awareness and practice professional ethics in day-to-day work.		ethics. Developing strong work ethics.	
44	Automation in Manufacturing Elective – (CP34606T) Awareness on Automation in manufacturing process.	Understand automation in industry – manufacturing process.	Knowledge on material handling. Understand and distinguish between manual and Automated Assembly lines.	Identify and explain the assembly processes in industry.
45	Connector Assembly Elective – (CP34607T) Perform stripping, crimping, connector assembling, in industry.	Familiarization of connector assembly procedure in the industry.	Identification of harnesses.	Stripping insulation from conductor cable. Crimp connections and assemble connectors.
46	Project/ Case study – (CP34609P)			Case study under the work area under the guidance of faculty or executive in the work area.
47	OJT (CP34513P) OJT (CP34610P)			On the Job Training in the relevant sector
48	Employability Skills (CP34514T) (CP34611T) Understand Labour Welfare and Legislation. Understand the concept of Quality Management Getting ready for Employment/ Entrepreneurship Learn to interact with customers/ provide service.	Knowledge on benefits guaranteed under various Acts, legislations, Factories act, Apprenticeship Act, ESI, EPF Acts, Payment of wages act, women's compensation Act, POSH, and other industrial laws. Understanding of Quality concepts, QMS, PDCA QC Tools, 5S, Kaizen. ISO Process. Distinguishing between Job and Career, Awareness of different job roles in the related sector. Understanding the pathway and progression. Creating resume and apply for Jobs.	Explain various Acts enacted for labour welfare by various Governments. Attend mock interviews, create Resume documents. Body language, relationship building, probing techniques.	Use of various QC tools and Kaizen for problem solving and Quality improvement themes. Customer handling from greeting, grievance handling.

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