



QUALIFICATION FILE

Fitter - Electrical and Electronics equipment

- ☐ 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: 3.5

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	Fitter- Electrical and Electronics equipment							
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: Fitter-Electrical and Electronics Equipment						
4.	a. OEM Name b. Qualification Name (Wherever applicable)	NA							
5.	National Qualification Register (NQR) Code & Version (Will be issued after NSQC approval)	QG-3.5-EH-01398-2023-V1-NTTF	6. NCrf/NSQF Level: 3.5						
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	Fitter - Electrical and Electronics Equipment will be able to identify the components used and carry out sub assembly/assembly of Electrical & Electronics equipments and harnesses in product manufacturing. The subjects covered in this programme are – Engineering Mathematics - I, Technical Communication - I, Electrical and Electronics, Modern Shop Floor Practices, Industrial Orientation, Manufacturing Technology, Engineering Mathematics - II, Technical Communication - II, Basics of Computer, Analog Electronics, Engineering Graphics, Testing of Electronics components, Introduction to Wire Harnessing, Employability Skills, Electrical and Electronics Lab, Mechanical Workshop, Analog Electronics Lab, OJT							
9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Academic/Skill Qualification (with Specialization - if applicable)</th> <th>Required Experience (with Specialization)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Minimum 10th Pass OR 8th pass + 2 years ITI in Electrical, Electronics and Instrument technician and relevant trades. OR 8th pass + Skill Level 3.0 in relevant trade</td> <td>NA</td> </tr> </tbody> </table>		Sl. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization)	1	Minimum 10th Pass OR 8th pass + 2 years ITI in Electrical, Electronics and Instrument technician and relevant trades. OR 8th pass + Skill Level 3.0 in relevant trade	NA
Sl. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization)							
1	Minimum 10th Pass OR 8th pass + 2 years ITI in Electrical, Electronics and Instrument technician and relevant trades. OR 8th pass + Skill Level 3.0 in relevant trade	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)	270	135	585	-	990
		Online	210				210
		(Refer Blended Learning Annexure for details)					
14.	Aligned to NCO/ISCO Code/s (if no code is available mention the same)	NCO Code – 2015/7412.0200, 2015/7412.0201, 2015/7412.0203, 2015/7421.0101					
15.	Progression path after attaining the qualification. (Please show Professional and Academic progression)	Professional Progression: After Completion of 1 year of Full Time Programme can work as Assistant 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 Manager, Line Supervisor, Maintenance engineer, Quality inspector, Team leader, Maintenance manager, Senior Technician, Technician Academic Progression: Advanced Certificate - Technician Electrical and Electronics Assembly (Level 4.0), 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: Technician - 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: nttfrg.com	
23.	Final Approval Date by NSQC: 30 Nov2023	24. Validity Duration: 3 Years	25. Next Review Date: 30 Nov2026

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 – 1																
1	Engineering Mathematics - I	CP34101T	Core	3.5	20	45	-	-	-	45	100	-	-	-	100	
2	Technical Communication - I	CP34102T	Core	3.5		30	-	-	-	30	75	-	-	25	100	
3	Electrical and Electronics	CP34103T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
4	Modern Shop Floor Practices	CP34104T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
5	Elective-1/2 (Choose One)	CP3410X*T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
6	Electrical and Electronics Lab	CP34107P	Core	3.5		-	45	-	-	45	-	75	-	25	100	
7	Mechanical Workshop	CP34108P	Core	3.5		-	30	-	-	30	-	75	-	25	100	
8	OJT	CP34109P	Core	3.5		-	-	300	-	300	-	75	-	25	100	
9	Employability Skills	CP34110T	Core	3.5		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					20	225	75	300	-	600	550	225	-	125	900	
Semester – 2																
10	Engineering Mathematics - II	CP34201T	Core	3.5	20	45	-	-	-	45	100	-	-	-	100	
11	Technical Communication - II	CP34202T	Core	3.5		30	-	-	-	30	75	-	-	25	100	
12	Basics of Computer	CP34203T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
13	Analog Electronics	CP34204T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
14	Engineering Graphics	CP34205P	Core	3.5		-	30	-	-	30	-	75	-	25	100	
15	Elective -3/4 (Choose One)	CP3420X*T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
16	Analog Electronics Lab	CP34208P	Core	3.5		-	30	-	-	30	-	75	-	25	100	
17	OJT	CP34209P	Core	3.5		-	-	285	-	285	-	75	-	25	100	
18	Employability Skills	CP34210T	Core	3.5		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					20	255	60	285	-	600	550	225	-	125	900	
Total for 1-year Programme					40	480	135	585	-	1200	1100	450	-	250	1800	

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 - 1 (Elective NOS/s: Elective 1/2 (CP3410X*T))																
1	Industrial Orientation	CP34105T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
2	Manufacturing Technology	CP34106T														
Semester – 2 (Elective NOS/s: Elective 3/4 (CP3420X*T))																
3	Testing of Electronics components	CP34206T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
4	Introduction to Wire Harnessing	CP34207T														

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 PercentagePlease 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 Safety Practices Describe the types of Mechanical Hand Tools. Understanding Basic Engineering Mathematics Knowledge of operating procedures of different Electronics and Electrical measuring tools and equipments Basic understanding on functioning of basic Electronics components Knowledge of Electrical safety, Circuit protective devices, basic DC & AC Sources Explain the importance of Metrology in industry. Identify the measuring instruments and application. Explain the types of wires and its selection Explain the need of Engineering drawing	Able to follow the safety Practice at work area Select the right Hand Tools for Mechanical activities Application of basic mathematical concepts in evaluating Electronics and Electrical Engineering Use of right equipments, modes and ranges for measuring Electrical parameters Identify the Electronic components, Characteristics and their polarity and other specifications. Identify the Electrical safety and protective devices, AC & DC components. Demonstrate principles of measurement, operation of measuring instruments, selection and use. Identification of Wires, connectors and testing and harnessing of wires Application of drawing standards, types of projections, drafting, dimensioning, drawing interpretation	3.5
Professional and Technical Skills/ Expertise/ Professional Knowledge	Able to read the circuit diagrams, identify the Electrical and Electronic components and its values Draw mechanical and Electrical drawings and interpret them. Explain the soldering process	Select the right components for desired application Follow safety at work place Assemble components and solder PCB Assembling of Electronics components and harnesses in product manufacturing	3.5

	Exhibit and maintain a safe working environment and good housekeeping practices		
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Understanding of good behaviour and work ethics. Knowledge of constitutional values. Read, write and comprehend English Language. Communicate and expressive.	Demonstrate responsible behaviour, good work culture, valued citizens of the country. Perform day to day activities effectively, report day to day happenings from time to time, write official/ personal communication to the superiors	3.5
Broad Learning Outcomes/Core Skill	Specify the safety and best practices followed in the work area. Describe Electronics components and equipments. List out the measuring tools, explain the operating procedure Interpretation of Mechanical and Electrical drawings. Knowledge on wires, protective devices, wiring practices	Will follow all safety norms and standard operating Procedures in the work area. Application of skills in the Electronic assembly for manufacturing. Basic troubleshooting of simple Electronics circuits	3.5
Responsibility	Aware of Personal/Industrial goals Adapt to changes in the work area	Work with caution and with due diligence to safety. Advocate safety to peers.	3.5

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			

Note:

- The Tools and Equipment and other lab facilities are shared between Qualifications and batches.
- During the admission the trainees are supplied with toolkit containing DMM, soldering rod, Breadboard, and other tools for conducting experiments in different labs.
- Trainees are provided with Laptop.
- Microcontroller Lab, IoT Lab will form a part of Digital Electronics Lab.
- Instrumentation and Measurement and Industrial Electronics will form a part of the Electronics lab.

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.vasu@rosseltechsys.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:1st 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 -1					
Engineering Mathematics – I	Carry out basic maths operations	10	-	-	-
	Knowledge of units of measurement in MKS system	10	-	-	-
	Calculate area of volume of regular shapes	15	-	-	-
	Knowledge of Percentage and ratio	15	-	-	-
	Solution to single variable algebra	15	-	-	-
	Knowledge of angles	15	-	-	-
	Knowledge of mean, median, mode, average, frequency	20	-	-	-
Total Marks		100			
Technical Communication - I	Read with proper punctuation and answer questions	10	-	-	5
	Listen to a paragraph and write	10	-	-	5
	Write about a given object	15	-	-	5
	Identify synonyms and Antonyms	15	-	-	5
	Write a technical description of a process	25	-	-	5
Total Marks		100			
Electrical and Electronics	Knowledge of electrical Safety and Protective Devices	10	-	-	-
	Concepts of basic electricity	10	-	-	-
	Identify and use of electrical hand tools	10	-	-	-
	Use and handling of measuring instruments	15	-	-	-
	Calculate electrical parameters in DC and AC circuits	20	-	-	-
	Identify the parameters of electronic components	10	-	-	-
	Knowledge of wires, cables and current carrying capacity	15	-	-	-
	Soldering of components	10	-	-	-
Total Marks		100			

Modern Shop Floor Practices	Implementation of 5S	25	-	-	-
	Demonstrate the knowledge of Gemba and kaizen	20	-	-	-
	Concept of Poka Yoke and Just in Time	25	-	-	-
	Knowledge of Muda, Muri and Mura	30	-	-	-
	Total Marks	100			
Elective (Industrial Orientation)	Knowledge of various departments of an Industry	20	-	-	-
	Reduction of wastes in industry	30	-	-	-
	Knowledge about good manufacturing practices	50	-	-	-
	Total Marks	100			
Elective (Manufacturing Technology)	Good Safety practices in industry	20	-	-	-
	Knowledge of hand tools, crimping tools and their specifications	30	-	-	-
	Wire harnessing instructions and methods	25	-	-	-
	Understanding work instructions of connector assembly	20	-	-	-
	Total Marks	100			
Employability Skills	Introduction to Employability skills	20	-	-	5
	Behaviour skills	20	-	-	5
	Constitutional Values and Citizenship	35	-	-	15
	Total Marks	100			
Electrical and Electronics Lab	Safety precaution when handling electrical equipment	-	5	-	-
	Identification and use of Electrical tools	-	10	-	5
	Knowledge of DMM, Power supplies, CRO and FG	-	15	-	5
	Reading the values of resistor, capacitor, and inductors	-	10	-	5

	Application of Ohm's law, Kirchhoff's law	-	15	-	-
	Transformers – Familiarization, Polarity test	-	10	-	5
	Demonstrate crimping, wire harnessing and soldering	-	10	-	5
	Total Marks	100			
Mechanical Workshop	Using of length and angles using various instruments	-	15	-	-
	Using various hand tools. Read values of components using multi-meter	-	15	-	15
	Usage of various gauges.	-	20	-	10
	Filing and Drilling operations	-	25	-	-
	Total Marks	100			
OJT	Performance during on-the-job training	-	35	-	15
	Knowledge of various machines used during OJT	-	40	-	10
	Total Marks	100			
Semester -2					
Engineering Mathematics - II	Calculate work done and energy consumed	20	-	-	-
	Doing statistical analysis	35	-	-	-
	Calculate probability of event occurring	25	-	-	-
	Solve problems using matrix	20	-	-	-
	Total Marks	100			
Technical Communication - II	Answer questions based on a paragraph	10	-	-	5
	Participate in a group discussion and debate	30	-	-	5
	Technical writing of a process and its presentation	35	-	-	15
	Total Marks	100			
Basics of Computer	Typing and formatting	20	-	-	-

	Prepare a PPT presentation	25	-	-	-
	Data Analysis using excel	35	-	-	-
	Open a website and know the contents	20	-	-	-
	Total Marks	100			
Analog Electronics	Characteristics of diode, use of diodes in circuits	25	-	-	-
	Transistor and its applications	25	-	-	-
	Working of a regulated power supply	50	-	-	-
	Total Marks	100			
Engineering Graphics	Draw isometric views and orthographic projection	-	25	-	5
	Dimensioning of the drawings	-	10	-	10
	Drawing of Screw threads	-	20	-	5
	Drawing electrical and electronic circuits	-	20	-	5
	Total Marks	100			
Elective : Testing of Electronics components	Measure the parameters of passive components, diodes.	25	-	-	-
	Measure the parameters of transistors and power semiconductors	25	-	-	-
	Measure the parameters of transformer.	20	-	-	-
	Test the ICs in power supply	30	-	-	-
	Total Marks	100			
Elective: Introduction to Wire Harnessing	Know the parameters to select wire, identify the wire	20	-	-	-
	Knowledge of parameters to select connector	30	-	-	-
	Methods of shield termination, harness bundle protection	30	-	-	-
	Reference designation to various parts of circuits.	20	-	-	-
	Total Marks	100			
Employability Skills	Effective learning skills	20	-	-	5

	English skills - Writing Skills	25	-	-	5
	Communication skills - Effective Oral and Written Communication	30	-	-	15
	Total Marks	100			
Analog Electronics Lab	Measure and analyse VI characteristics of diode	-	10	-	5
	Design half and full wave rectifier with & without filter	-	10	-	-
	Design Clipper and Clamper circuits	-	10	-	5
	Measure and analyse VI characteristics of Zener diode	-	10	-	5
	Measure and analyse transistor characteristics	-	10	-	-
	Design circuit using Switch, Inverter (NOT Gate)	-	10	-	5
	Identify and test Power Electronics Components - BJT, MOSFET, IGBT, SCR	-	15	-	5
	Total Marks	100			
OJT	Explain the use of various machines used	-	30	-	10
	Know the specifications of various machines	-	35	-	10
	Methods used to reduce wastes	-	10	-	5
	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.nttftg.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.nttftg.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.nttftg.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 – 1		Module Name: Engineering Mathematics – I	Module Code: CP34101T
Sl. No.	Module Details		Theory Hours 45
1	Basic Arithmetic		3h
2	Units of Measurements		3h
3	Mensuration		6h
4	Percentage, Ratio and Proportion		8h
5	Basics of Algebra		6h
6	Trigonometry		10h
7	Basic Statistics		9h
	Total Hour		45 h

Semester – 1		Module Name: Technical Communication - I	Module Code: CP34102T
Sl. No.	Module Details		Theory Hours 30
1	Reading comprehension and Exercises		4h
2	Listening comprehension and Exercises		3h
3	Construction of sentences – Exercises		6h
4	Dictionary learning		4h
5	Synonyms and Antonyms		4h
6	Technical Report Writing		9h
	Total Hour		30 h

Semester – 1		Module Name: Electrical and Electronics	Module Code: CP34103T
Sl. No.	Module Details		Theory Hours 60
1	Electrical Safety and Protective Devices		6h
2	Basics of Electricity		6h
3	Hand tools and their usage		4h

4	Measuring Instrumentation	4h
5	DC Circuits	4h
6	AC Circuits	6h
7	DC Power Sources	6h
8	Electronics Components	12h
9	Electrical Wires, Cables and Connectors	6h
10	Basics of Soldering	6h
Total Hour		60 h

Semester – 1		Module Name: Modern Shop Floor Practices	Module Code: CP34104T
Sl. No.	Module Details	Theory Hours 30	
1	5S	5h	
2	Gemba	4h	
3	Kaizen	5h	
4	Poke Yoke	2h	
5	Just In Time	4h	
6	Standards	6h	
7	Muda, Mura and Muri	4h	
Total Hour		30 h	

Semester – 1		Module Name: Industrial Orientation – Elective (Industry Specific)	Module Code: CP34105T
Sl. No.	Module Details	Theory Hours 30	
1	Industrial Orientation	20 h	
2	Good Manufacturing Practices of Industry	10 h	
Total Hour		30 h	

Semester – 1		Module Name: Manufacturing Technology – Elective (Industry Specific)	Module Code: CP34106T
Sl. No.	Module Details	Theory Hours 30	
1	Safety Practice	4h	
2	Introduction to Metrology	6h	
3	Hand Tools – Types, Specification and Applications	4h	
4	Crimping of Connectors	3h	

5	Basics of Wire Harnessing	5h
6	Work Instructions of Connector Assembly	4h
7	Work Instructions of Wire Harnessing	4h
Total Hour		30 h

Semester – 1		Module Name: Electrical and Electronics Lab	Module Code: CP34107P
Sl. No.	Module Details	Practical Hours 45	
1	Electrical Safety	2h	
2	Identification and use of Electrical tools	2h	
3	Familiarization of Digital Multimeter (DMM)	2h	
4	Familiarization of Power supply, CRO and FG	2h	
5	Electronics Components Identification and testing- Resistor, Capacitor, Inductor	4h	
6	Understanding of Ohm's law, Kirchhoff's law	4h	
7	Transformers – Familiarization, Polarity test	3h	
8	Testing of- Earth Resistance, MCB, Relay	4h	
9	Familiarization Wires (Power cable/Logic cable)	2h	
10	Practice on Crimping	6h	
11	Practice on Wire Harnessing	6h	
12	Soldering Practice	8h	
Total Hour		45 h	

Semester – 1		Module Name: Mechanical Workshop	Module Code: CP34108P
Sl. No.	Module Details	Practical Hours 30	
1	Practice on using Steel Rule, Measuring Tape, Vernier Caliper, Micrometer, Bevel Protractor and Height Gauge Electronics Lab Safety and Instructions	6h	
2	Usage of Hand Tools – Files, Spanner, Crimping tool, and Fillet Gauge. Familiarization of Multi-meter	4h	
3	Usage of Gauges – Go and No Go, Radius, Fillet Gauge, Feeler Gauge and Standard Wire Gauge.	4h	

4	Filing Practice	12h
5	Drilling Practice	4h
Total Hour		30h

Semester – 1		Module Name: OJT	Module Code: CP34109P
Sl. No.	Module Details	Practice Hours 300	
1	On the Job Training in the relevant sector	300 h	
Total Hours		300 h	

Semester – 1		Module Name: Employability Skills	Module Code: CP34110T
Sl. No.	Module Details	Theory Hours 30	
1	Introduction to Employability skills	10h	
2	Behaviour skills	10h	
3	Constitutional Values and Citizenship	10h	
Total Hours		30 h	

Semester – 2		Module Name: Engineering Mathematics – II	Module Code: CP34201T
Sl. No.	Module Details	Theory Hours 45	
1	Work, Power Energy – Calculation	6h	
2	Statistics	10h	
3	Probability	16h	
4	Matrix	13h	
Total Hour		45 h	

Semester – 2		Module Name: Technical Communication - II	Module Code: CP34202T
Sl. No.	Module Details	Theory Hours 30	
1	Written comprehension	6h	
2	Spoken English	6h	
3	Group Discussion	4h	
4	Debate	3h	

5	Technical report Writing	5h
6	Presentation Skills	6h
	Total Hour	30 h

Semester – 2 Module Name: Basics of Computer Module Code: CP34203T		
Sl. No.	Module Details	Theory Hours 30
1	Computer and its peripherals	4h
2	Basics of MS Word	6h
3	Basics of MS PowerPoint	6h
4	Basics of MS Excel	6h
5	Internet	8h
	Total Hour	30 h

Semester – 2 Module Name: Analog Electronics Module Code: CP34204T		
Sl. No.	Module Details	Theory Hours 60
1	Introduction to Semiconductor devices	6h
2	Diode Characteristics	4h
3	Diode Circuits	8h
4	Diode Applications	12h
5	Transistor	8h
6	Transistor Application	14h
7	Regulated Power supply	8h
	Total Hour	60 h

Semester – 2 Module Name: Engineering Graphics Module Code: CP34205P		
Sl. No.	Module Details	Practical Hours 30

1	Introduction	2h
2	Geometric Construction	4h
3	Isometric views and Orthographic Projection	6h
4	Dimensioning	6h
5	Screw threads	3h
6	Understanding Simple Shop Floor Drawing	3h
7	Electrical / Electronic Drawing	6h
Total Hour		30 h

Semester – 2 Module Name: Testing of Electronic Components – Elective (Industry Specific) Module Code: CP34206T		
Sl. No.	Module Details	Theory Hours 60
1	Testing of Passive Components	10h
2	Testing of Diodes	6h
3	Testing of Transistors	8h
4	Testing of Power semiconductor devices	8h
5	Testing of Transformer	8h
6	Testing of Industrial used devices	10h
7	Testing of IC in power supply	10h
Total Hour		60 h

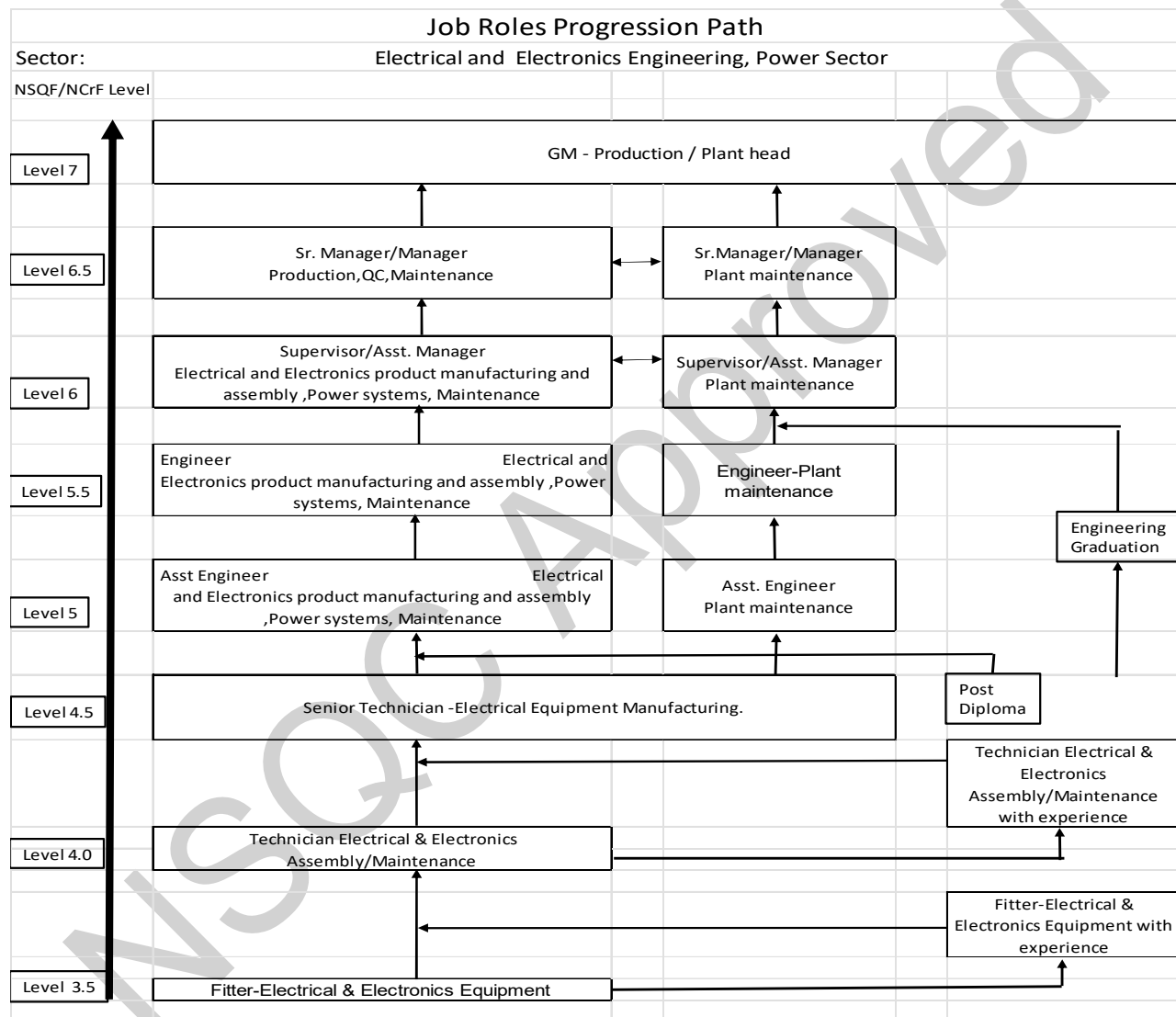
Semester – 2 Module Name: Introduction to Wire Harnessing – Elective (Industry Specific) Module Code: CP34207T		
Sl. No.	Module Details	Theory Hours 60
1	Wire Selection criteria	8 h
2	Wire Identification	8 h
3	Connector Selection	10 h
4	Reference Designations	8 h
5	Shield Termination	8 h
6	Harness Bundle Protection	8 h

7	Testing	10 h
Total Hour		60 h

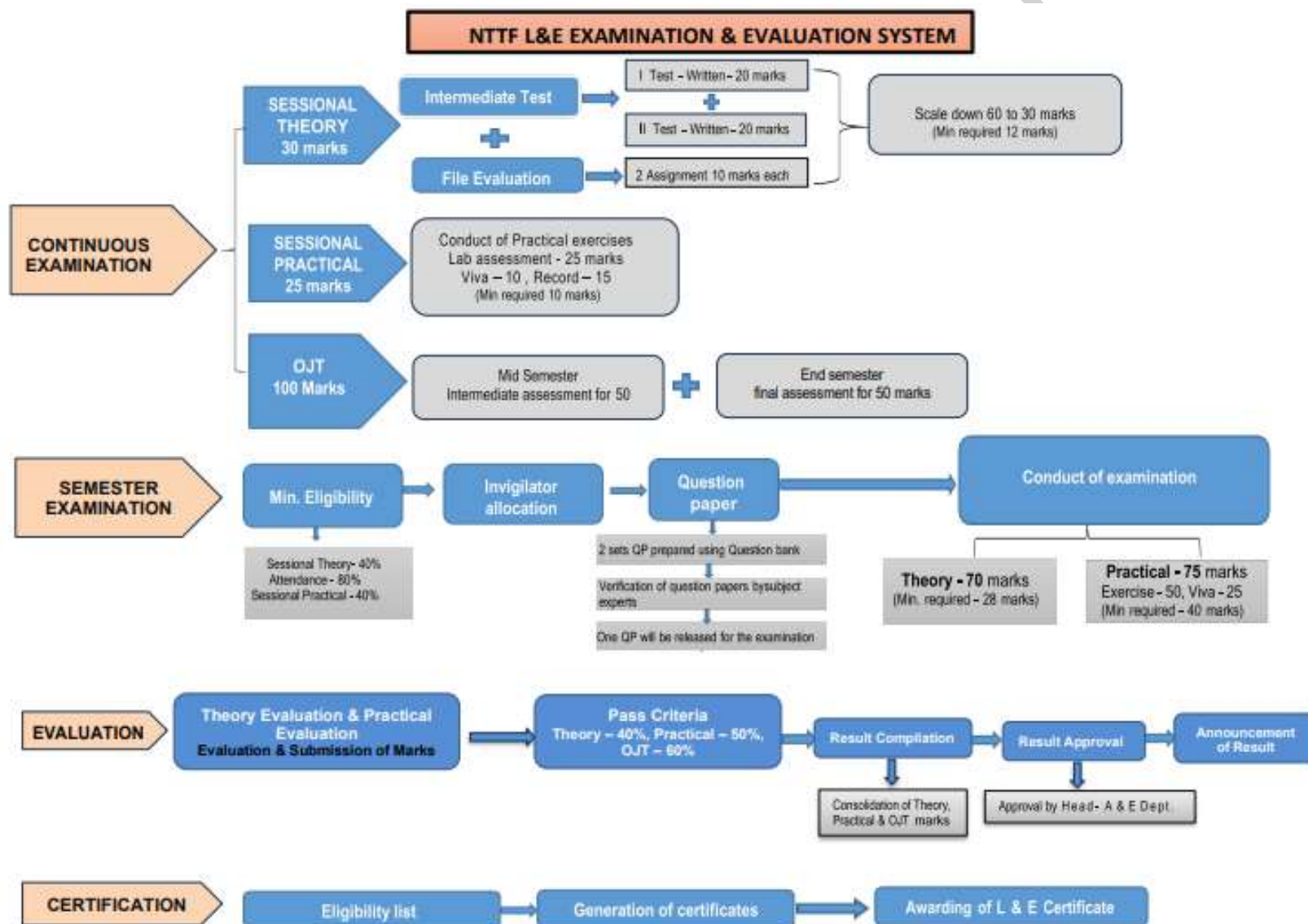
Semester – 2		Module Name: Analog Electronics Lab	Module Code: CP34208P
Ex. No.	Module Details	Practical Hours 30	
1	VI characteristics of diode	2h	
2	Half wave rectifier with and without filter	2h	
3	Full wave rectifier with and without filter	4h	
4	Clipper and Clamper circuits	4h	
5	VI characteristics of Zener diode	2h	
6	Transistor characteristics (CE configuration)	4h	
7	Transistor Applications as a Switch, Inverter (NOT Gate)	4h	
8	Power Electronics Components Identification and testing - BJT, MOSFET, IGBT, SCR	8h	
Total Hour		30 h	

Semester – 2		Module Name: OJT	Module Code: CP34209P
Sl. No.	Module Details	Practice Hours 285	
1	On the Job Training in the relevant sector	285 h	
Total Hours		285 h	

Semester – 2		Module Name: Employability Skills	Module Code: CP34210T
Sl. No.	Module Details	Theory Hours 30	
1	Effective learning skills	7h	
2	English skills - Writing Skills	8h	
3	Communication skills - Effective Oral and Written Communication	15h	
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: 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	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	3122	Engineer Electrical and Electronics product manufacturing and assembly, Power systems, Maintenance	Engineer-Plant maintenance
Level 5	4. Broad Learning Outcomes: Specialized/ complex jobs/tasks 5. Responsibility: Self and team responsibility – 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.	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	Technician-Industrial Electrical. Cable laying and maintenance Panel board tester and maintenance. Diagnosis of electrical faults
Level 3.5	1. Professional Theoretical Knowledge: Range of knowledge 2. Professional and Technical Skills/ Expertise: Range of technical skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Work in a team-Follow instructions 4. Broad Learning Outcomes: Carry out Range of tasks with minimum supervision 5. Responsibility: Follow instructions - Assistant	7412 7421 7419	Fitter electrical and electronic equipment, wire loom maker, Generator operator. Assembly & Fitting	Technician Electrical and electronic Maintenance of electrical equipment. Generator maintenance. Electric system repairer.

Annexure 12: Key Learning Outcome

SL. NO.	MODULE NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL & PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
FIRST YEAR				
1	Engineering Mathematics -1 (CP34101T) Engineering Mathematics -2 (CP34201T) Apply mathematical formulas and theorems for determining various Technical and Engineering parameters.	Understand various Trigonometric terms, theorems and equations and their utility. Knowledge and understanding on statistics, probability and Matrix.	Perform Arithmetic operations. Determine Ratio, proportions and percentages. Application of Statistical methods for data interpretation.	Determine and assign units to Engineering quantities and variables. Determine dimensions, perimeter, Area and Volume using associated formulas for engineering needs. Determine work, power energy for engineering applications.
2	Technical communication – 1 (CP34102T) Technical communication – 2 (CP34202T) Listen, comprehend, and communicate by speaking, writing, Discuss, present ideas.	Able to listen and understand. Identify and express the antonym and synonyms.	Read and comprehend. Make meaningful sentences. Use dictionary. Speak and express ideas.	Write technical reports. Discuss ideas in groups and debate over ideas usability. Present ideas in respective job roles.
3	Electrical & Electronics (CP34103T) Electrical and Electronics Lab (CP34107P)	Distinguish between charges, current, potential difference and emf. Explain DC sources and their applications. Knowledge in use of measuring equipments (DMM, Oscilloscope etc).	Identify, and read the specifications of Electrical Components like Wires, Switches, Sockets, Plug, Switches, Fuse, and other protective devices. Explain fundamentals of AC and DC circuits and components, apply basic laws - ohm's law and Kirchhoff's laws in basic electrical circuits. Conversant with the usage of various electrical measuring instruments. Identification and testing of electronic	Practice all the safety procedures. Identify appropriate passive and active components as per the application. Identify Electrical hand tools used in their workplace. Selection and applications of electrical wires, cables, and connectors as per industrial Norms. Apply various soldering and de-

			components (Resistors, Inductors, Capacitors). Testing transformer polarity, earth resistance.	soldering techniques under different situations as applicable.
4	Modern Shop Floor Practices (CP34104T) Practice the modern shopfloor practices in their work area.	Understand the concept of 5S & KAIZEN, Poka Yoke, Just in Time in their work environment.	Explain 5S & KAIZEN, Poka Yoke. Explain MUDA, MURA, MURI in their workplace	Practice the various shopfloor practices like 5S, Kaizen, Poka Yoke, MUDA, MURA and MURI.
5	Industrial Orientation (CP34105T) - Elective Aware of various procedures and practices in the organization.	Understand and incorporate company work culture and ethics. Explain Electrostatic Discharge (ESD)	Familiarized with Operator Work Standard (OWS). Identify the part numbers, Inspection procedures, Material Review Board (MRB)	Participate in 5S work culture, SIM Meeting in their workplace. Understand the Manufacturing Practices specific to their industry – TCFM, CCM, C&P, CLAP, SSA.
6	Manufacturing Technology (CP34106T) - Elective Perform tasks associated with the job-role specific to the industry.	Knowledge on use of different hand-tools for his job role. SOP and Work instructions associated to his work area. Explain use of various wires and harness, connectors specific to industry.	Perform measurements specific to the industry. Identify different hand tools, crimping tools and harnesses specific to the job.	Practice safety practices in work area. Crimping of harness specific to his role in the industry.
7	Mechanical Workshop (CP34108P) Use of mechanical measuring instruments and perform basic operations in the workshop.	Identify different measuring instruments and their purposes. Identify different hand tools, and gauges.	Determine least count, measure physical variable quantities. SOP for use of different hand tools and Gauges.	Use appropriate measuring instruments in measure variables in the job role. Use appropriate hand tools and Gauges in the job role. Filing and Drilling process.
8	Basics of Computer (CP34203T) Identify the parts of a computer.	Identify parts of a computer and peripherals.	Open and work with Microsoft office applications.	Identify and report on different computer parts and peripherals. Work effectively with MS office applications.

	Perform Microsoft office applications, conversant with use of Internet.			
9	Analog Electronics (CP34204T) Analog Electronics Lab – (CP34208P) Identify Electronic components and their applications	Knowledge on semiconductors and semiconductor devices. Explain Characteristics and applications of semiconductor devices. Knowledge on power electronics devices – BJT, MOSFET IGBT, SCR etc.	Identify Semiconductor devices. Distinguish between different rectifiers, rigging rectifier circuits, shaping circuits. Characteristics of Zener diode and Special purpose diodes. Transistor circuits rigging and explanation.	Work with regulated power supply. Trouble shoot simple small electronic circuits.
10	Engineering Graphics (CP34205P) Draw, read and comprehend Engineering Drawings.	Knowledge on different drafting materials. Knowledge on geometric constructions, different projections, and dimensioning.	Create and convert different projections. Dimensioning techniques.	Draw, read and comprehend various Engineering drawings in the job role.
11	Testing of Electronic components (CP34206T) - Elective SOP for testing of various Electronic and Electric components.	Knowledge on testing various Passive, semiconductor, Power devices, transformer and other industry specific devices.	Correlate different characteristics of electronic components and devices with the testing process.	Perform testing of various Electronic and Electrical devices in the industry.
12	Introduction to wire harnessing (CP34207T) - Elective Selection, harnessing, designation, termination of harness.	Understanding on wire selection criteria. Understanding reference designation	Wire identification methods. Connector selection. Shield termination. Harness bundle protection.	Selection, harnessing, crimping connectors, shield termination, bundle protection in the production process.
13	OJT (CP34109P) OJT (CP34209P)			On the Job Training in the relevant sector

14	Employability Skills (CP34110T) (CP34210T) Ability to behave appropriately. Understand Constitutional Values/ role of citizen. Ability to communicate appropriately. Understand Diversity and Inclusion.	Knowledge and understanding of all Human relation Principles. Knowledge and understanding of the constitution of Indian state and the preamble of the constitution. Fundamental Duties of the citizen of India. Knowledge and understanding of types of communication. Good understanding about Diversity and Inclusion in the workplace.	Able to practice HRP with peer groups to maintain healthy relationships. Practice the constitutional values in society. Being ethical and moral in society following all the fundamental duties in the society. Practice effective communication with peers, superiors and subordinates with empathy and care. Practice a sense of belonging in the society leaving behind all differences due to race, ethnicity, gender, age, identity etc.	Follow all the skills in the workplace and society to have peace and harmony with superiors and subordinates.
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Annexure: Acronym and Glossary**Acronym**

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

Glossary

Term	Description
National Occupational Standards (NOS)	NOS 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