QUALIFICATION FILE

Assistant Technician Electronics Assembly

☐ Short Term Training (STT) ☑ Long Term Training (LTT) ☐ Apprenticeship
☐ Upskilling ☐ Dual/Flexi Qualification ☐For ToT ☐ For ToA

☑ General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☐ Future Skills ☐ OEM

NCrF/NSQF Level: 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**	**Assistant Technician-Electronics Assembly**	
2.	**Sector/s**	Electrical and Electronics	
3.	**Type of Qualification:** ☑ **New** ☐ **Revised** ☐ **Has Electives/Options** ☐ **OEM**	**NQR Code & version of existing/previous qualification:** *(Change to previous, once approved)*	**Qualification Name of existing/~~previous~~ version:** Assistant Technician Electronics Assembly
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-01401-2023-V1-NTTF	**6. NCrF/NSQF Level: 3.5**
7.	**Award (Certificate/Diploma/Advance Diploma/ Any Other** *(Wherever applicable specify multiple entry/exits also & provide details in annexure)*	Certificate.	
8.	**Brief Description of the Qualification**	The Candidate will be able to do Assembling and Soldering of Electronic Components, Identification of Components, read the drawing, Modelling and Simulation of Electronics Systems. The subjects covered in this Programme are – English, Mathematics, Mechanical, Electrical, Applied Science, Analog and Digital Electronics, Computer- Aided Design and Employability Skills.	
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 - if applicable)**
1	Minimum 10th Pass OR 8th pass + 2 years ITI in Technician Electronics System, Repair of electronic systems, Mechanic Consumer Electronic Appliances, Technician Power Electronic Systems OR 8th pass + Skill Level 3.0 in relevant trade	NA

<table>
<tr><td>10.</td><td>Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>Total Credits – 40</td><td>11. Common Cost Norm Category (I/II/III)
(Wherever applicable): NA</td></tr>
<tr><td>12.</td><td>Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">NA</td></tr>
<tr><td>13.</td><td>Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="2">☐ Offline ☐ Online ☑ Blended
<table>
<tr><th>Training Delivery Modes</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>OJT/Project Mandatory (Hours)</th><th>OJT Recommended (Hours)</th><th>Total (Hours)</th></tr>
<tr><td>Classroom (offline)</td><td>480</td><td>570</td><td>90</td><td>NIL</td><td>1140</td></tr>
<tr><td>Online</td><td>60</td><td></td><td></td><td></td><td>60</td></tr>
</table>
(Refer Blended Learning Annexure for details)</td></tr>
<tr><td>14.</td><td>Aligned to NCO/ISCO Code/s (if no code is available mention the same)</td><td colspan="2">NCO Code –2015/3114.0100</td></tr>
<tr><td>15.</td><td>Progression path after attaining the qualification (Please show Professional and Academic progression)</td><td colspan="2">Professional Progression:
After Completion of 1 year, can work as Assistant Technician. Electronics Assembly
After Completion of 3Years of Full Time Programme and after 3 years of Industry Experience the Job Holder can work as Test Engineer, R&D Engineer, Servicing Engineer and Maintenance Engineer.

Academic Progression:
Advance Certificate – Technician-Electronics and Instrumentation (Level 4.0), Diploma – Electronics and Embedded Systems (Level 4.5), Post Diploma, B VoC and B.Tech Degree Course in Relevant Areas.

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</td></tr>
<tr><td>16.</td><td>Other Indian languages in which the Qualification & Model Curriculums are being submitted</td><td colspan="2">Hindi</td></tr>
<tr><td>17.</td><td>Is similar Qualification(s) available on NQR-if yes, justification for this qualification</td><td colspan="2">☐ Yes ☑ No URLs of similar Qualifications: NA</td></tr>
</table>

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)	
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 Number:** 9844013448 **Website: nttftrg.com**	
23.	**Final Approval Date by NSQC: 30 Nov 2023**	**24. Validity Duration: 3 years**	**25. Next Review Date: 30 Nov 2026**

Section 2: Module Summary

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

Mandatory Modules/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	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	Communication: English - 1	CP04101T	Core	3.5	19	60	-	-	-	60	62.5	-	-	37.5	100	
2	Applied Mathematics - 1	CP04102T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
3	Applied science	CP04103T	Core	3.5		40	-	-	-	40	100	-	-	-	100	
4	Electronics - 1	CP04104T	Core	3.5		40	-	-	-	40	100	-	-	-	100	
5	Electrical Engineering - 1	CP04105T	Core	3.5		40	-	-	-	40	100	-	-	-	100	
6	Applied Science Lab	CP04106P	Core	3.5		-	30	-	-	30	-	80	-	20	100	
7	Electronics - 1 Lab	CP04107P	Core	3.5		-	60	-	-	60	-	80	-	20	100	
8	Electrical Engineering - 1 Lab	CP04108P	Core	3.5		-	60	-	-	60	-	80	-	20	100	
9	Engineering Drawing/ Fusion 360	CP04109P	Core	3.5		-	60	-	-	60	-	80	-	20	100	
10	Workshop-1 Practical	CP04110P	Core	3.5		-	60	-	-	60	-	80	-	20	100	
11	Computer Lab	CP04111P	Core	3.5		-	30	-	-	30	-	80	-	20	100	
12	Employability Skills	CP04112T	Core	3.5		30				30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					**19**	**270**	**300**			**570**	**537.5**	**480**		**182.5**	**1200**	
Semester – 2																
13	Communication: English – 2	CP04201T	Core	3.5	21	40	-	-	-	40	62.5	-	-	37.5	100	
14	Applied Mathematics – 2	CP04202T	Core	3.5		40	-	-	-	40	100	-	-	-	100	
15	Analog Electronics - 1	CP04203T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
16	Electrical Engineering - 2	CP04204T	Core	3.5		40	-	-	-	40	100	-	-	-	100	
17	Digital Electronics - 1	CP04205T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
18	Analog Electronics –1 Lab	CP04206P	Core	3.5		-	60	-	-	60	-	80	-	20	100	

19	Electrical Engineering –2 Lab	CP04207P	Core	3.5		-	60	-	-	60	-	80	-	20	100	
20	Digital Electronics –1 Lab	CP04208P	Core	3.5		-	60	-	-	60	-	80	-	20	100	
21	Workshop-2 Practical	CP04209P	Core	3.5		-	40	-	-	40	-	80	-	20	100	
22	Electrical Drawing Lab	CP04210P	Core	3.5		-	50	-	-	50	-	80	-	20	100	
23	Employability Skill	CP04211T	Core	3.5		30	-	-	-	30	75	-	-	25	100	
24	OJT	CP04212P	Core	3.5				90		90		75	-	25	100	
Duration (in Hours)/ Total Marks					**21**	**270**	**270**	**90**		**630**	**537.5**	**475**		**187.5**	**1200**	
Total for 1-year Programme					**40**	**540**	**570**	**90**		**1200**	**1075**	**955**		**370**	**2400**	

Elective Modules/NOS/s: NA

S. No	NOS/Module Name	NOS/Module Code & Version *(if applicable)*	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) *(if applicable)*
1.																
2.																
Duration (in Hours) / Total Marks																

Optional Modules/NOS/s: NA

S. No	NOS/Module Name	NOS/Module Code & Version *(if applicable)*	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) *(if applicable)*
1.																
2.																
Duration (in Hours) / Total Marks																

Assessment - Minimum Qualifying Percentage

*Please specify **any one** of the following:*

Minimum Pass Percentage :*(Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear assessment)*

To pass the Qualification, every trainee should score minimum of 40% in each Theory, 50% in Practical and 60%in Project work / Internship and viva-voce.

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 of 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 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 Up skilling 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 of 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)*	Blended theory (online and offline in the centre) and practical
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 electronics Industries. 1. MSDE Annual Report 2021- 2022 predict very high growth in Electronics and Automobile sector in India. 2. MSDE/ NSDC Human Resources and Skill Requirements in Electronics and IT Hardware report (2013- 17, 2017–22) The Report Forecast a Higher growth in Electronics and IT Hardware sector. 3. Human Resources and Skill Requirements in Telecommunications sector report (2013-17, 2017 –22) The Report Forecast a Higher growth in Telecommunications sector. 4. Human Resources and Skill Requirements in Healthcare sector report (2013- 17, 2017 –22) The Report Forecast a Higher growth in Electronics and IT Hardware sector. 5. Annual reports 2021 – 22 of Ministry of Electronics and Information Technology Government of India The above Studies has found Higher growth in Electronics and IT Industries.
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 Electronics and Automobile Industries 1. Indian Skills Report 2021-22 by **Wheebox** – partnered CII predicts skill requirement in Engineering and Manufacturing sectors, Pharma & Health care Sector, Software/Hardware & IT sector 2. Study on T& A Consulting, The Indian Electronics Industry 3. The Study has found Test Engineer, R & D Engineer, Hardware Designer has new job roles emerging in the Manufacturing Sector. 4. Indian cellular and Electronics research report predicts very high growth in Domestic manufacturing and export of Electronics Manufacturing in India.
3.	**Government /Industry initiatives/ requirement (Yes/No): Yes –** • MSDE/ NSDC Human Resources and Skill Requirements in Electronics and IT Hardware report (2013- 17, 2017–22) The Report Forecast a Higher growth in Electronics and IT Hardware sector. • 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:** 36
5.	**Estimated nos. of persons to be trained and employed: 400 / 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.	**Annexure 13:** 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)
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. - Describe the types of Electrical/Electronic Hand Tools. - Describe Active and Passive Components - List and explain the Logical functions. - Explain the laws governed in electric circuits. - Explain the Boolean expressions and its simplification - Explain the Semiconductor devices & its characteristics - Explain the working principle of electrical Machines - Identify testing instruments	- Able to follow the safety Practice at work area - Select the right Hand Tools for Mechanical activities. - Select the appropriate hand tools for Electrical/ Electronic activities. - Identify active and passive components in electronic circuits. - Able to perform simple operations using logical functions. - Simplify the digital Circuits. - Analyse circuits using electrical laws. - Read data sheets of different semiconductor devices. - Able to operate electrical machines - Use the right equipments for measuring Electrical Parameters.	**3.5**
Professional and Technical Skills/ Expertise/ Professional Knowledge	-Specify electrical and electronic Components. -Create Electrical drawing using application software. -Create Mechanical drawing using application software. -Describe Combinational Circuits. -Illustrate the working of electrical Machines -Identify and describe the types of PCB -Describe Through hole and Surface Mount Technology - Explain the soldering process.	-Select the right components for desired application. - Design and implement basic Combinational circuit. -Able to operate Electrical Machines -Assemble components and solder PCB.	**3.5**
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	- Able to work effectively in a team - Able to Communicate with Peers - Describe good behaviour & work ethics. - Explain constitutional values. - Able to work as a Professional	- Adopt the changes and work in a team - Good verbal and written communication with Peers, Supervisors - 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 and write official / personal communication to the superiors.	**3.5**

		- Maintain Professionalism at work place	
Broad Learning Outcomes/Core Skill	- Can Perform Mathematical calculations - Prepare Reports and Presentations - Use internet for communication. - Proficiency in CAD and simulation software - Awareness of safety and operation standards, procedures and practice it in the work area	- Able to write technical reports - Able to create technical drawing - Follow all safety norms in the work area.	**3.5**
Responsibility	- Aware of Personal/Industrial goals. - Adapt to changes in the work area. - \Able to assemble, install and repair electronic components and systems.	- Work with caution and with due diligence to safety. - Able to Carry out design, develop, test, produce and operate electrical and electronic equipment and systems. - Can work with minimum supervision.	**3.5**

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

List of Tools and Equipment for a batch of 30 trainees

ELECTRICAL & ELECTRONICS LAB

Sl. No.	Equipment	Specification	Quantity
1	Digital Oscilloscope	No of Channels - 2, Bandwidth: DC - 30 MHz	10
2	Dual - Power Supplies Regulated Power Supply, Adjustable	0-30V/1A	10
3	Dual - Fixed Power Supply	15-0-15 V/2A	10
4	Soldering Station - Temperature Controllable	25W	1
5	IC Tester (for Linear IC's)		1
6	IC Tester (for Digital IC's)		1
7	Function Generator	Frequency Range: 0.3 Hz to 3 MHz, Functions: Sine, Square, Triangle, DC Sweep	10
8	LCR - Q Bridge Meter		1
9	Digital Trainer Kit	Fixed +5V/ 1Amp, 16pin ZIF Socket, Logical switch with I/O Indicators, 4mm patch cords with short circuit & Overload Protection.	10
10	Three Phase Inductor motor	1hp/0.75kW	2
11	Three Phase Inductor motor	Star Delta Type/1hp	1
12	DC Motor and DC Generator Set, Including Speed Controller	1hp/220V	1
13	DC Source Variable	0-300V/10A	1
14	Single Phase Transformer	500VA/5A/230V/115V, with Terminal Point	2
15	Three Phase Transformer	440V/1kVA/15A with Terminal Box	1
16	Watt meter	(AC/DC) 1250W/300V/5A UPF	1
17	Watt meter	(AC/DC) 1250W/300V/5A LPF	2
18	Autotransformer	1 Phase,0-270 V,2A, with case and Main chord	2

19	Autotransformer	3 Phase/440V/1KVA	1
20	Relays, Switches, Fuse and other protective devices (Fuse, MCB, ELCB)		5 Each
21	Energy Meter	Single Phase (kwh) 50 Hz	1
22	Decade Resistance box - 6 Dials	0.1 to 1 MΩ	2
23	Decade Capacitive box - 5 Dials	0.1 to 10 µf/63V	2
24	Decade inductive box - 5 Dials	0.1m to 10mH/1A	2
25	Rheostat	0-500Ω/10W	3
26	Megger	Digit 0-2000 M Ohms 1000 V DC	1
27	Clamp meter	72-AUTO, 400A AC	1
28	Mini Hacksaw	6 inches	1
29	PVC Pipe Cutter	1 inch	1
30	Crimping tool		1
31	Electronics Work Bench	To be Fabricated	3
32	Electrical Work Bench	To be Fabricated	3
33	Electrical Workstation	To be Fabricated	6

APPLIED SCIENCE LAB

Sl. No.	Equipment	Specification	Quantity
1	Force table	Force Table Circular with diameter 40cm with slotted weights 5x50g - 4 sets with marking.	2
2	Spring balance	5N & 10N	2 each
3	Slotted Weights	Slotted weights 10x100g (9 slotted Weight + 1 Hanger) Total 1000g	2
4	Simple pendulum Set	(Bob Pendulum) with stand	1
5	Balance stand	Wooden Wedge on Pillar	2

6	Stopwatch	Digital	1
7	Spring Constant Apparatus with weights		2
8	Retort Stand	with Boss Head & Clamp	2
9	Flow Cup Viscometer stand	Material SS, MS, Type Viscometer	2
10	Measuring Jar	Material: Glass, Thickness: 2-10mm, Capacity: 500ml	2
11	Measuring Jar	Material: Glass, Thickness: 2-10mm, Capacity: 1 Litre	2
12	Digital Balance	500g cap LC 0.01g	1

MECHANICAL WORKSHOP
MACHINE TOOLS & EQUIPMENTS

Sl. No.	Machine	Specification	Quantity
1	Workbench with Lockers - 2 Vices/Bench	1.5mX0,8mX0.7m	5
2	Bench Vice	125mm	10
3	Flat bastard file	300mm	10
4	Flat Second Cut File	250mm	5
5	Triangle second cut File	250mm	5
6	Square second cut file	250mm	5
7	Steel Rule	150mm	10
8	Steel Rule	300mm	10
9	Scriber	150mm	5
10	Center Punch	60^0 & 90^0	5
11	Try Square	150mm	5
12	Hacksaw with Blade	300mm	5
13	Hammer	200g	5
14	Hammer	500g	2
15	Caste Iron Surface Plate	1000x630 with stand	1
16	Angle Plate	200x100	1

17	V-Blocks	125mmX90mmX70mm	1 Pair
18	Vernier Height Gauge	450mm L.C 0.02	1
19	Magnetic V Block	100mmX70mmX95mm	1 Pair
20	Vernier caliper	150mm, LC0.02	6
21	Digital Vernier caliper	300mm, LC 0.01	1
22	Micrometer (External)	(0-25) mm	3
23	Micrometer (External)	(25-50) mm	1
24	Radius & Filled Gauge	1mm – 7mm 7.5mm – 15mm	2
25	Standard Wire Gauge	S.W.G – Round wire gauge	2
26	Feller Gauge	0.025mm to 0.63mm	2
27	Screw Pitch Gauge	0.25mm to 6mm	2
28	Double Ended Spanner Set	6 mmx 7mm, 8mm x 9mm, 8mm x 10mm, 9mm x 11mm, 10mm x 11mm, 10mm x 12mm,12mm x 13mm, 13 mmx 16mm, 14mm x 15mm, 14 mmx 17mm, 16mm x 17mm, 18mm x 19mm,18mm x 21mm, 19 mmx 22mm, 20mm x 22mm	1
29	Ring Spanner set	6 mmx 7mm, 8mm x 9mm, 10mm x 11mm,12mm x 13mm, 14mm x 15mm,16mm x 17mm, 18mm x 19mm, 20mm x 22mm	1
30	Socket Spanner Set	SOCKETS SETS - 6.3mm Sockets - 4,4.5,5,5.5,6,7,8,10,11,12,13, 14,1/4, T20, T25, T30, T40 Accessories - A733, A743, A753, A773, A703, A715	1
31	Allen key set	1.5, 2, 2.5, 3, 4, 5, 6, 8,10mm	2
32	Nose plier	Long Nose – 170mm	2
33	Circlip Plier – Internal & External	Internal – 19mm – 60mm External – 19mm – 60mm	2
34	Screwdriver Set	6.0 x 0.8, 3.5 x 0.5	2
35	Torque Wrench	25mm,25 to 200Nm	1
36	Pipe Wrench	450mm	1
37	Pipe Vice	15-155mm	1

38	Soft Hammer	25mm	3
39	Tap & Tap Wrench	(M4-M12,200mm & M6-M20,375mm)	3
40	Die & Die Stock	(M4-M12(200mm), M6-M8(200mm) & M6-M20(375mm))	2 Sets
41	Vernier Bevel Protector	Blade Length – 150mm, LC 5'	1
42	Dial Indicator Lever Type	0.01,0,8mm	1
43	Dial Indicator Plunger Type	0.01,0-10mm	1
44	Magnetic Stand	70mmX48mmX64mm	1
45	Parallel Block Set	150mm x 10mm x 6mm 150mm x 20mm x 10mm 150mm x 30mm x 15mm	1
46	Tool Storage Cabinets		1

MACHINE TOOLS & ACCESSORIES

Sl. No.	Machine	Specification	Quantity
1	Bench Drilling Machine with Accessories	0-12mm	1
2	Bench Grinder	Wheel dia:200mm thick 25mm	1
3	Power hacksaw	350mm	1
4	Machine Cupboard		2

Note:

- The Tools and Equipments and other lab facilities are shared between Qualifications and batches.
- During the admission the trainees are supplied with toolkit containing DMM, soldering iron, Breadboard, and other tools for conducting experiments in different labs.
- Trainees are provided with Laptop.

Classroom Aids

The aids required to conduct sessions in the classroom are: 1. Black / white board.
2. Projector with screen / Smart 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 *(if available)*
1	Tata Power SED Limited (Presently TASL)	Mrs.Mahima		Electronics city, Bangalore	8067859900	mahima@tatapowerSED.com	
2	L&T Infotech Limited	Mr.joji George		saki vihar road, Powai ,Mumbai	2267766776	joji.george@lntinfotech.com	
3	National Instruments india Limited	Mr.yogesh Sundaramurthy		7th block, Koramangala, Bangalore	8051190000	yogesh.sundaramurthy@ni.com	
4	Lucas -TVS Limited	Mr.Kamalakannan D		Padi, Chennai	4426235515	kamalakannan.engg@lucastvs.co.in	
5	Coreel Technologies Limited	Mr Harish		21,7th main, 1st Block, Koramangala	080 41970400	harish@coreel.com	
6	Tessolve India Limited	Mrs.Shoba Annamalai		Tessolve Services Pvt Ltd, Plot No.31, Electronics City Phase II	8041812626	shoba.annamalai@tessolve.com	
7	Samsung India Limited	Mr.Suresh		Block - 'B',66/1, Bagmane Tech Park, Byrasandra C V Raman Nagar,	9845408281	s.suresh@samsung.com,	
8	Delopt India	Ms.Seema		3 & 4, 1st Cross, 7th Main, J C Industrial Area, Off Kanakapura Main Road, J C Industrial Area	080-26668286	seema@delopt.co.in	
9	Wipro Technologies	Mr.Anjana Varma		No 72, Keonics Electronic City,	7259034096	anjana.varma@wipro.com	
10	Syscon Instruments	Ms.Gayatri		plot #66, Hosur road , Electronics city	91 80 28520772/3/4	gayatri@sysconinstruments.com	
11	Centum	Mr.Jason		44 Yelanhka New Town, KHB Industrial Area , Bangalore	91 80 41436000	agnellaj@centumelectronics.com	
12	Techno Sphere	Ms. Rohini		7, 1st East Main, ITI Layout, BSK 3rd Stage,	91-80-4171-1409	nk@technosphereindia.in	
13	Ecopower	Mr.Mohan		551, 14TH Main Sector 7,	9980585005	mohan@ecopower.in	

				HSR Layout , Bangalore			
14	Radel Electronics	Mr. Manjunath		No.74/D, Hosur Road Electronics city , Bnagalore	9342420720/80 -28520720	hr@radel.in	
15	Sun Micro Components	Rakesh a bagadi		New city complex ,SN 101 to106 #13/30 to 13/35,1 st floor NR road cross	080-22293923	techsupport@sunmicrocomponents.com	
16	Gemini Communications	Malakrishna TC		#1, Dr ranga road ,2 street , allwarpet, chennai	044-24996422	info@qci.in	
17	Park Controls	Ms. Manisha		#22,80 feet road , HAL, 3rd stage ,	080-25297199	info@parkscontrols.com	
18	APLAB (team lease)	Mr. Deepak		BMTC complex ,6 th floor ,80 feet road , Koramangala	080-33002345	Deepak.p@aplab.com	
19	Unique tech integration	Savan G Gangadhol		#42/A9th a main BTM Layout , 1 st stage	080-25525546	blr@uniquetech.com	
20	Neuro synaptic	Mrs. Rich Kumar		10, 3RD floor, Next to swetha bakery, 29 th main, BTM layout 2nd stage	080-41313168	richa@neurosynaptic.com	
21	Panacea Medical Technologies	Mrs.Ambika		Plot # 119, Envision Technology Center, EPIP Area Phase 1, Whitefield.	080- 4242 8700	careers@panaceamedical.com	
22	Micropack limited	Mrs. Lakshmi		Plot No 16,Jigani Industrial Area, Anekal Taluk	7760976713	hr@micropack.com	
23	All 3 Axies	Mr.Senthil		#32, 1st Floor, Krishna Reddy Layout, Domlur	9739469620	senthil@all3axis.com	
24	Juno Tele	Mr.Vikas		4th Block, Pattabhirama Nagar, Jayanagar, Bengaluru	8041477477	Vikas@junotele.com	
25	Source Technologies	Mr.Prasanth		# 67, Govindappa Road, Basavanagudi,	80-26571838	Prashanth@sourcetechnologi.com	
26	Rossel Techsys	Ms. Jenniffer		plant at No. 74, 3rd	7259821385	jennifer.james@rosselltechsys	

				cross, Export Promotion Industrial Park, Whitefield,		.com	
27	Usha Martin	Mr. Raju		2A,Shakespeare Sarani,'Mangal Kalash' ,Kolkata 700071	9339800300/39 800458	contact@ushamartin.co.in	
28	Qualcomm India Private Limited	Shailesh kumar		Bangalore	8892631728	kumarsha@qti.qualcomm.com	
29	Tata Cummins Pvt Ltd.	Phanindra Mishra		Pune	9264499320	phanindra.mishra@cummins.co	
30	Frauscher Sensor Technology	Poornima		Bangalore	8904062133	poornima.krishna@in.frauscher.com	
31	Amossys Digital Pvt Ltd	Raghavebdra S		Jharkhand	7980095043	rajeev.k@acsg.co.in	
32	HTL	Rani Drairaj		Tamilnadu	9843683156	ananda.shankar@htlchennai.com	
33	Zenco India Pvt Ltd	Keshav Singh		Karnataka	9739993901	keshavksingh@zincoelectric.com	
34	Infosys	Richard Lovo		Karnataka	8028520261	askus@infosys.com	
35	Micromatic Machine Tools Pvt. Ltd.	Srinivasa V		Karnataka	080 4943 3100	srinavasav@acemicromatic.com	
36	Wistron	Ms Renuka prasad		Kolar	9008854352	renukaprasad_sg@wistron.com	

Annexure 4: Training & Employment Details

Training and Employment Projections: *Data to be provided year-wise for the 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	**300**	More than 3000	150	More than 2000	-	
2024	**400**	More than 3000	200	More than 2000	-	
2025	**500**	More than 3000	250	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 / Higher Studies	Trained	Assessed	Certified	Placed
	2017- 2020	196	183	163	163	56	51	45	45	NIL			
	2018 - 2021	150	146	142	142	39	36	35	35				
	2019 - 2022	167	155	146	146	46	41	36	36				

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 Three years Full Time 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

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline: Online Ratio
1	Theory/ Lectures - Imparting theoretical and conceptual knowledge	Physical classroom, LMS, Web based	90:10
2	Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	Physical classroom, Workshops, Mock sessions, Case study, Role play, Group Discussions, LMS	90:10
3	Showing Practical Demonstrations to the learners	Workshop / Lab, Video recording, Simulators	80:20
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Workshop machines, Lab equipment, Simulators, Mini projects, Project	80:20
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	75:25
7	On the Job Training (OJT)/ Project Work Internship / Apprenticeship Training	Industry	100:00

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					
Communication: English -1	Parts of Speech-Form meaningful Sentences	22	-	-	-
	Verb Tenses-Use of right verb and tenses	10	-	-	7.5
	Language and Skill Development Exercises –Exercises on writing sentences	17.5	-	-	-
	Writing Skills-Writing letters & reports	6	-	-	-
	Sentences-Forming right sentences	7	-	-	10
	Language Skill Development-Oral communication skills	-	-	-	20
	Total Marks	**100**			
Applied Mathematics -1	Fundamentals of Mathematics-Solving arithmetical problems	20	-	-	-
	Matrices and Determinants-Solving Problems	20	-	-	-
	Complex Numbers -Understanding Complex Numbers	10	-	-	-
	Trigonometry-Application in Engineering	20	-	-	-
	Differential Calculus-Fundamentals	15	-	-	-
	Statistics-Application in Engineering	15	-	-	-
	Total Marks	**100**			
Applied Science	Physical World-Physical quantities & units	10	-	-	-
	Force, Motion and Energy –Definition & units	10	-	-	-
	Composition and Resolution of Forces-Resolving Forces	8	-	-	-
	Friction-Definition, Application in Engineering	8	-	-	-
	Equilibrium of Forces-Determining equilibrium of forces	8	-	-	-
	Centre of Gravity and Moment of Inertia-Determining for different objects	12	-	-	-
	Properties of Solids and Fluids- Properties of Solids and Fluids-	12	-	-	-

	Heat-Definition, Unit	12	-	-	-
	Industrial Chemistry-Introduction to pollution, Corrosion	12	-	-	-
	Renewable Energy-Introduction to wind and solar energy	8	-	-	-
	Total Marks	**100**			
Electronics -1	Introduction to Electronics – Voltage, Current and Units	5	-	-	-
	Basic Components of Electronics –Symbol, Types, Specification and application of Passive components, Series and Parallel Connection	20	-	-	-
	Laws of Electronic Circuits – Ohm's law, Voltage divider and current divider circuits	15	-	-	-
	Introduction to Semiconductors – Energy bands, Doping, Intrinsic and Extrinsic Semiconductors	15	-	-	-
	PN Junction Diode & its applications – Diode characteristics and application circuits	25	-	-	-
	Special Purpose Diodes – Characteristics of Zener, LED, Schottky, Varactor and Tunnel Diode	15	-	-	-
	PCB Assembly & Soldering -Types of PCB, THT and SMT technology	5	-	-	-
	Total Marks	**100**			
Electrical Engineering - 1	Fundamentals of Electric Circuit- Potential Difference & Electro Motive force, Power sources and applications	10	-	-	-
	DC Sources – Cells and battery and its applications	5	-	-	-
	Laws of Electricity – Basic laws and analysis	15	-	-	-
	AC Fundamentals – AC & DC and its parameters Single ϕ & three ϕ –power factor, applications Star and Delta Connection	20	-	-	-
	Protective Devices –Types, working and applications	25	-	-	-
	Earthing – need and methods	10	-	-	-
	Types of Power Generation –Types of power generations	15	-	-	-
	Total Marks	**100**			

Employability Skill	Employability skills-Importance & applicability	20			5
	Behavior skills-Positive Attitude and Good Teamwork	20			5
	Constitutional Values & Citizenship-Awareness of our constitutional values	35			15
	Total Marks	**100**			
Applied Science Lab	Verification of Newton's third law of motion	-	10	-	5
	Parallelogram law: Find weight of a given body	-	10	-	-
	Triangle law of forces: Find the weight of a given body	-	10	-	5
	Verify Polygon law of forces using force table	-	10	-	-
	To measure torques on a rigid body	-	10	-	-
	Determination of acceleration due to gravity by using simple pendulum	-	5	-	-
	Determination of spring constant of the given helical spring	-	5	-	-
	Compare viscosity of two fluids using flow cup viscometer	-	10	-	5
	Experiments to understand surface tension	-	10	-	5
	Total Marks	**100**			
Electronics - 1 Lab	Identification of Electronic Components and testing	-	5	-	5
	To Measure AC and DC using measuring instruments	-	10	-	5
	Find the value of passive components	-	10	-	5
	Verification of Ohm's law, Voltage divider and Current divider	-	5	-	
	Verification of Diode, Zener and LED characteristics	-	15	-	5
	To rectify the AC voltage using different rectifier circuits	-	20	-	-
	Regulate the voltage using Zener diode	-	5	-	-
	Test the soldering skill	-	10	-	-
	Total Marks	**100**			

Electrical Engineering - 1 Lab	Identification and specification of different types of Wires, Switches, Plugs and sockets	-	5	-	5
	Demonstrate the electrical wiring for different applications	-	10	-	5
	Verify the series and parallel connections of battery	-	10	-	
	To verify the Kirchhoff's current and voltage laws	-	10	-	5
	To verify the Super Position Theorem	-	10	-	5
	Measurement of Electrical quantities in Resistive Load and Inductive Load	-	5	-	-
	Demonstrate the application of Relay	-	5	-	-
	Verify the Earthing in the work bench	-	5	-	-
	To perform Domestic House wiring	-	10	-	-
	To observe the Loading effect on Power Supply	-	10	-	-
	Total Marks	**100**			
Engineering Drawing/ Fusion 360	Introduction about Engineering drawing – Application of Engineering Drawing	-	10	-	-
	Basics of Engineering Drawing- Fundamental aspects of Engineering Drawing	-	5	-	5
	Geometric Construction – Construction of Geometric shapes	-	10	-	-
	Projection- First and Third angle projection	-	15	-	5
	Dimensioning – Dimensioning of drawings	-	8	-	2
	Introduction to sectional view	-	10	-	-
	To Draw the given Isometric Diagrams into Orthographic views (2D Views)	-	10	-	-
	Creating Sketches, Dimensioning and Modelling using Fusion 360	-	5	-	5
	To Draw the Two-dimensional (2D) diagrams as per given dimensions using Fusion 360	-	7	-	3
	Total Marks	**100**			

Workshop -1 Practical	General safety rules for conduction of Workshop-while using hand tools and machines	-	4	-	2
	U – Channel exercise – Sawing, filing	-	14	-	2
	Steel Angle exercise– Sawing, filing	-	8	-	2
	Marking and Dot Punching	-	6	-	-
	Number and Letter Punching	-	6	-	-
	Chain drilling exercise- Drilling method	-	8	-	
	Drill Plate Exercise-Sizing, milling, drilling, counter bore etc.	-	14	-	4
	Pen stand Exercise	-	10	-	4
	Application based exercise	-	10	-	6
	Total Marks	**100**			
Computer Lab	Identification, Specification types of parts of a computer	-	15	-	5
	Perform the PC tools	-	15	-	5
	Creation of document in word using various options	-	15	-	-
	To write a professional email	-	10	-	-
	To prepare a technical presentation	-	10	-	5
	To create the charts, pivot table, lookup functions etc. in Excel	-	15	-	5
	Total Marks	**100**			
Semester -2					
Communication: English - 2	Internal correspondence-Memo, reports	6	-	-	4
	Technical Writing- Technical reports, procedure	6	-	-	4
	Organizational correspondence-Notice and agenda, Minutes of meeting	5	-	-	5.5

	Writing skill (activity based)	9.5	-	-	6
	Public Speaking-Shop talk, Lab talk	18	-	-	8
	Interview skills-Resume, Cover letter, Mock interview.	18	-	-	10
	Total Marks	**100**			
Applied Mathematics – 2	Percentage, Ratios and Proportions-Application in Engineering	10	-	-	-
	Permutation and Combination- Application in Engineering	15	-	-	-
	Analytical Geometry-Introduction & Application in Engineering	25	-	-	-
	3D Shapes-Introduction to 3D Shapes	15	-	-	-
	Integral Calculus-Basics of calculus	20	-	-	-
	Statistics- Statistics for analyzing Data	15	-	-	-
	Total Marks	**100**			
Analog Electronics - 1	Diode Applications – Diode applications like Half Wave Rectifier, Full wave Rectifier, clipper, clamper etc.	20	-	-	-
	Transistor Configurations and Biasing – Construction, working, Configurations, Biasing, Interpretation of Datasheet	20	-	-	-
	Small Signal BJT amplifiers – DC and AC analysis of small signal amplifiers	20	-	-	-
	Differential Amplifiers – Construction and working of Differential amplifier, Current mirror	10	-	-	-
	Operational amplifier basis –Parameters, Specification and applications	10	-	-	-
	Junction Field Effect Transistor -Working of JFET and MOSFET and its characteristics	10	-	-	-
	Opto Electronic Devices – Working of Photo transistor, Opto coupler and Solar cell	10	-	-	-
	Total Marks	**100**			

Electrical Engineering - 2	Magnetic Circuits – Magnets, types, magnetic flux, flux density, MMF, reluctance	7	-	-	-
	Electromagnetism and Induction – magnetism & electricity relation, Faraday's law, induced EMF	7	-	-	-
	Transformer- Types, transformation ratio, construction, losses, efficiency, tests, autotransformer, instrument transformer, applications	16	-	-	-
	D.C Generator- construction, working principle, types & applications.	14	-	-	-
	D.C Motor – construction, working principle, rated speed, speed regulation and control, characteristics	14	-	-	-
	A.C Generator – construction, working principle, speed – frequency relation, difference between DC & AC generators	8	-	-	-
	A.C Motor (Induction motor) – construction, working principle, self-starting and reversal of 1-Ø induction motor. Applications	10	-	-	-
	Three Phase Induction Motor – construction & working, reversal, efficiency, synchronous speed, torque slip characteristics, starting methods.	14	-	-	-
	Special Purpose Motor- permanent magnet DC motor, stepper motor, BLDC, Universal servo motor	10	-	-	-
	Total Marks	**100**			
Digital Electronics - 1	Introduction to Digital Electronics - Difference between Analog & Digital Signals	10	-	-	-
	Number Systems and Code Conversions – Different number systems and its conversion, 1's and 2's complements	10	-	-	-
	Logic Gates – Symbol, Truth table of logic gates	15	-	-	-
	Boolean Algebra and Boolean function Implementation -Basic theorems & laws of Boolean algebra, SOP, POS, K Map	20	-	-	-
	Combinational Logic Circuits – Types and applications	20	-	-	-
	Timers and Timing Circuits - Types and applications	10	-	-	-
	Integrated Logic Families – Specification, parameters and applications	15	-	-	-

	Total Marks	**100**			
Employability Skill	Becoming a Professional in 21st Century	20			5
	English skills -Writing Skills	20			5
	Communication skills -Effective Oral & Written Communication	35			15
	Total Marks	**100**			
Analog Electronics –1 Lab	To rectify the voltage using different rectifiers and its comparison	-	15	-	5
	To verify the applications of diode	-	15	-	5
	To plot the i/p and o/p characteristics of CE, CC configuration	-	10	-	5
	To verify the frequency response and square wave test of CE amplifier	-	5	-	-
	To verify CC amplifier	-	10	-	5
	To verify Transistor as a Switch	-	5	-	-
	To verify NPN Current mirror	-	10	-	-
	Demonstrate the characteristics of MOSFET	-	10	-	-
	Total Marks	**100**			
Electrical Engineering –2 Lab	To practice the Control panel wiring	-	15	-	5
	Transformer – Step up and down operation, ratio and polarity test, losses and load test, three phase transformer connection	-	10	-	
	DC Motor- Starting, speed control of DC shunt motor.	-	15	-	5
	AC Machines – Internal resistance measurement, DOL starter and reversal, ON delay timer control of 3Ø induction motor,	-	20	-	5
	Autotransformer starting of 3Ø induction motor, automatic STAR DELTA switching of 3Ø induction motor.	-	15	-	5
	Familiarisation on DG	-	5	-	-

	Total Marks	**100**			
Digital Electronics –1 Lab	To verify the truth table of of GATE ICs, Implementation of GATEs using other GATE components.	-	10	-	3
	Implementation of Sum of Products and vice versa using GATEs and K- Map techniques	-	10	-	2
	Code conversions	-	10	-	
	Adder and subtractor circuits design and analysis. Using IC packages.	-	10	-	5
	Familiarization of Encoders, decoders, MUX, DEMUX, Latches and applications	-	10	-	2
	Design of A-stable, Monostable Multi- vibrator and application	-	15	-	5
	Design, implementation of counters, familiarisation of counter IC packages	-	15	-	3
	Total Marks	**100**			
Workshop-2 Practical	Introduction to machines - Lathe, Milling, Surface grinding i.e. Introduction to all operations in the machine. Operating methods	-	40	-	10
	Sheet metal exercise-Drilling , Threading , riveting in sheet metal	-	40	-	10
	Total Marks	**100**			
Electrical Drawing Lab	Autodesk eagle software – Library, simple electrical wiring, domestic wiring. – simulation	-	20	-	4
	Transformer, 1-Ø, 3-Ø connection, DOL starter and reverse connection- 3-Øinduction motor – simulation	-	30	-	8
	Basic electronic circuits simulation using LT spice software	-	30	-	8
	Total Marks	**100**			
OJT	Presentation	-	75	-	25
	Total Marks	**100**			

Annexure 7: Assessment Strategy

1 ASSESSMENT STRATEGY

The Criteria for assessment is based on Modules, and. 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 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 by 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 / senior faculty 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.

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
- Tech Talk / Shop Talk
- Extracurricular and Co-curricular Activities

- Projects
- 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 conduct of assessments, teaching methodology etc.

3 ELIGIBILITY TO APPEAR FOR THE EXAM:

- The candidates should have an attendance of a minimum 90% 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 customer needs & requirements and perform Soft Skills effectively:
    - Videos/photos of Trainees during OJT
    - Suggestions / Kaizens from trainees
    - Rewards and appreciation to trainees as applicable
3. Assessment will ensure the following:
    - Effective engagement with the customers
    - Understand the working of various tools and equipment.

7 SYSTEM OF GRADING:

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

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

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

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

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

Awarding of class:

a) Awarding of class for semester:

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

b) Awarding of class for Programme:

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

8 ASSESSMENT TOOLS

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

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

List of ICT Tools:

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

Annexure 8: Model Curriculum

Major Topics

Semester -1	Module Name: Communication: English-1	Module code: CP04101T
Sl. No.	**Module Details**	**Theory Hours 60**
1	Parts of Speech	20h
2	Verb Tenses	8h
3	Language and Skill Development Exercises	15h
4	Writing Skills	4h
5	Sentences	4h
6	Language Skill Development	9h

Semester -1	Module Name: Applied Mathematics – 1	Module code: CP04102T
Sl. No.	**Module Details**	**Theory Hours 60**
1	Fundamentals of Mathematics	6h
2	Matrices and Determinants	11h
3	Complex Numbers	9h
4	Trigonometry	14h
5	Differential Calculus	12h
6	Statistics	8h

Semester -1	Module Name: Applied Science	Module code: CP04103T
Sl. No.	**Module Details**	**Theory Hours 40**
1	Physical World	2h

2	Force, Motion and Energy	6h
3	Composition and Resolution of Forces	3h
4	Friction	3h
5	Equilibrium of Forces	5h
6	Centre of gravity and moment of inertia	5h
7	Properties of Solids and Fluids	4h
8	Heat	4h
9	Industrial chemistry	4h
10	Renewable Energy	4h

Semester – 1	**Module Name: Electronics – 1**	**Module code: CP04104T**
Sl. No.	**Module Details**	**Theory Hours 40**
1	Introduction to Electronics	5h
2	Basic Components of Electronics	8h
3	Laws and Rules of Electronic Circuits	3h
4	Introduction to Semiconductors	6h
5	PN Junction Diode and its applications	7h
6	Special Purpose Diodes	6h
7	PCB Assembly and Soldering	5h

Semester - 1	**Module Name: Electrical Engineering - 1**	**Module code: CP04105T**
Sl. No.	**Module Details**	**Theory Hours 40**
1	Fundamentals of Electric Circuit	3h
2	DC Sources	5h

3	Laws of Electricity	3h
4	AC Fundamentals	5h
5	Single Phase AC	5h
6	Three Phase AC	6h
7	Protective Devices	6h
8	Earthing	5h
9	Types of Power Generation	2h

Semester – 1	**Module Name: Employability Skills**	**Module Code: CP04112T**
Sl. No	**Module Details**	**Practical Hours 30**
1	Introduction to Employability skills	10h
2	Behaviour skills	10h
3	Constitutional Values & Citizenship.	10h

Semester - 1	**Module Name: Applied Science Lab**	**Module code: CP04106P**
Sl. No.	**Module Details**	**Practical Hours 30**
1	Vernier Calipers: Measure of volume of a solid cylinder	1.5h
2	Vernier Calipers: Measure of slant angle of a cone	1.5h
3	Vernier Calipers: Measure depth of a hallow cylinder	1.5h
4	Screw Gauge: Measure diameter of a thin wire. Find its SWG number	1.5h
5	Screw Gauge: Measure thickness of a metal sheet. Find its SWG number	1.5h
6	Measure diameter of a bore using a telescopic gauge	1.5h
7	Measure diameter of a small hole using small-hole gauge	1.5h

8	Determination of acceleration due to gravity by using Simple pendulum	1.5h
9	Verification of Newton's third law of motion	1.5h
10	Determination of spring constant of the given helical spring	1.5h
11	To measure torques on a rigid body	1.5h
12	Parallelogram law: Find weight of a given body	1.5h
13	Triangle law of forces: Find weight of a given body	1.5h
14	Verify polygon law of forces using force table	1.5h
15	Compare viscosity of two fluids using flow cup viscometer	1.5h
16	Experiments to understand surface tension	1.5h
17	Experiment to show working of fiber optic cable	1.5h
18	Generate electricity using wind energy	1.5h
19	Generate electricity using solar energy	1.5h
20	PV Panel Characteristics	1.5h

Semester - 1	**Module Name: Electronics - 1 Lab**	**Module code: CP04107P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	Electronics Lab Safety and Instructions	2h
2	Familiarization of Multi-meter	2h
3	Familiarization of Power Supply	2h
4	Familiarization of Function Generator and Cathode Ray Oscilloscope	4h
5	Familiarization of Tool Kit – Tools, Bread Board and its connections	2h
6	Symbols of Electrical and Electronic components	1h

7	Identification of Electronic Components and Equipment's	1h
8	Exercises based on Resistors – color code, series, parallel	4h
9	Exercises based on Capacitors – Value, series, parallel	4h
10	Ohms Law	4h
11	Voltage and Current divider rule	4h
12	Exercises based on PN Junction Diode	4h
13	Exercises based on Light Emitting Diode	4h
14	Familiarization of Transformer	2h
15	Exercises based on Half Wave rectifier	4h
16	Exercises based on Center Tapped Full Wave rectifier	4h
17	Exercises based on Bridge Full Wave rectifier	4h
18	Exercises based on Zener Diode	4h
19	Soldering Exercises on PCB	4h

Semester - 1 Module Name: Electrical Engineering - 1 Lab Module code: CP04108P		
Sl. No	**Module Details**	**Practical Hours 60**
1	Electrical Lab Safety and Instructions	4h
2	Explanation of Indian Electrical Rules	
3	Safety labels for Electrical equipment and facilities management	
4	Familiarization of electrical components	4h
4.1	Identify and specify different types of Wires used for different current and voltage ratings	
4.2	Identify and specify different types of Switches used for different applications as per current and voltage ratings	

4.3	Identify and specify different types of Sockets and Plugs used for differentcurrent and voltage ratings	
5	Parallel and Series wiring 3 loop/ 3 components	4h
6	One lamp by one switch	4h
7	2 Lamps by 1 switch	
8	Extension box	4h
9	Staircase wiring	4h
10	Go down wiring	
11	Familiarize the Battery and Battery in Series and parallel connection to make a battery bank	4h
12	To verify the Kirchhoff's current and voltage laws	4h
13	To verify the Super Position Theorem	4h
14	Loading effect on Power Supply	4h
15	Measurement of Electrical quantities in Resistive Load and Inductive Load	4h
16	Switching operation using Relay	4h
17	Familiarization of testing instruments: 1: Clamp-on meter. 2: Megger	2h
18	Checking whether Earthing is Proper by bulb method and DMM method	2h
19	Domestic House wiring	8h

Semester - 1	**Module Name: Engineering Drawing/ Fusion 360**	**Module code: CP04109P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	Introduction to Engineering Drawing - Drawing instruments, Types of lines	2h
2	Engineering Script - Lettering and numbering, Scale-full scale, reduced scale and enlarged scale, Drawing Sheet size, layout and title block	2h
3	Geometrical Constructions - Geometric forms, bisecting a line and dividing the line	1h

4	Projections - Isometric Drawing, Orthographic projections, Difference between 1st angle and 3rd angle projection	4h
5	Dimensioning - Basics Definitions and Dimensions	1h
6	Sectional View - Introduction to sectional view, Half-Sectional Views, Sectioning Objects with Holes, Ribs, etc.	2h
7	Draw the given Isometric Diagrams into Orthographic views (2D Views) using First Angle Projection. Draw the given Isometric Diagrams as per dimensions in the sketch book.	10h
8	Introduction to Fusion 360 - download the software, access your fusion 360 account, fusion 360 user interface, sharing the designs	3h
9	Designing Procedure (Sketching and Modelling) Creating Sketches Sketch Dimensioning Dynamic viewing function Display modes Modelling Modifying	10h
10	Draw the Two-dimensional (2D) diagrams as per given dimensions using Fusion 360 Draw the given Isometric Diagrams as per given dimensions using Fusion 360	25h

Semester - 1	**Module Name: Work Shop1 Practical**	**Module code: CP04110P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	General safety rules for conduction of Workshop	2h
2	U – Channel	10h
3	Steel Angle	7h
4	Marking and Dot Punching	5h
5	Number and Letter Punching	5h
6	Chain Drilling exercise	7h
7	Drill Plate	12h

8	Pen stand	6h
9	Application based exercises	6h

Semester - 1	**Module Name: Computer Lab**	**Module code: CP04111P**
Sl. No.	**Module Details**	**Practical Hours 30**
1	Parts of Computer Computer architecture, CPU, types of memory, Disk drive, Input devices, Keys of keyboard and mouse, Output devices, monitor, various connectors and cables of computer	1h
2	Data Representation Using Bit and Byte - Binary to decimal and decimal to binary conversion, Binary coded decimal, Hexadecimal, KB, MB, GB, TB, ASCII codes, Computer specifications	3h
3	Software - Operating system, GUI tools, directory, files, create, delete, recycle bin. Display resolution setting, Personalisation setting, Install and uninstall applications, Task bar setting	2h
4	Typing Tutorial - Familiarize typing in standard QWERTY keyboards. Touch Typing Course: Learn positions of all keys, keys for each finger. Achieve speed of 20 words per minute. Use all keys of keyboard.	2h
5	PC Tools - Internet concepts, IP address settings, Remote desktop, task manager, system date & time	2h
6	Creating Document (Word File) A text of about 100 words to be typed. Practice: Tab setting, font, font colour, text highlight, bold, italics, underline, superscript, subscript, set case Practice: Bullet, Numbering, indenting, alignment, line spacing, heading styles, find and replace, cut, copy and paste Layout: Margin, orientation, page size, columns. Insert: Pictures (text wrapping, format picture), shapes, 3D models, chart, table, comment, header, footer, page number, page break Create: Envelops, Labels, Mail merge Macro, Insert symbols and equations, Hyperlink. Create table of contents, page colour, page border, water mark	7h
7	email Handling Setting layout, CC and BCC, create address book, email filter. Create folders, set rules, auto reply, create signatures and create groups.	3h

	Setting calendar, email recall, sorting emails, attachments	
8	Power Point Presentation – Adding new slide, layout, Indenting and text direction, slide show Insert shapes, icons, 3D models, chart, video and audio. Insert table, screen shots, symbols, equations. Add comments, hyperlink and action, header and footer. Transition, animation and recording slide show, slide hide. Format shape, slide master, best practices	4h
9	EXCEL – Concept of cells, Rows and columns, fonts Format cells: Category, border, fill, protection, Insert and delete, Conditional formatting, create new rules. Insert functions: sum, average, if, countif, counta, countifs, max, min, value, text, date, datevalue, round, roundup, rounddown, sort, filter Iferror, AND, OR, Day, Days, Datevalue, GCD, LCM, ABS Chart, pivot table, group, subtotal, filter Freeze panes, hide, macro, page layout. Copy-paste options, VLOOKUP function	6h

Semester - 2	**Module Name: Communication: English - 2**	**Module code: CP04201T**
Sl. No	**Module Details**	**Theory Hours 40**
1	Internal correspondence	4h
2	Technical Writing	4h
3	Organizational correspondence	3h
4	Writing skill (activity based)	8h
5	Public Speaking	9h
6	Interview skills	12h

Semester - 2	**Module Name: Applied Mathematics - 2**	**Module code: CP04202T**
Sl. No.	**Module Details**	**Theory Hours 40**

1	Percentage, Ratios and Proportions	3h
2	Analytical Geometry	7h
3	Integral Calculus	8h
4	Laplace Transform	5h
5	Statistics	6h
6	Correlation and Regression	6h
7	Sequence and series	5h

Semester - 2	**Module Name: Analog Electronics - 1**	**Module code: CP04203T**
Sl. No.	**Module Details**	**Theory Hours 60**
1	Diode Applications	16h
2	Transistor Basics and Biasing	12h
3	Small Signal BJT Amplifiers.	12h
4	Differential Amplifiers.	4h
5	Operational Amplifier (Op-amp) basics	9h
6	Field Effect Transistor	3h
7	Opto-Electronic Devices	4h

Semester - 2	**Module Name: Electrical Engineering - 2**	**Module code: CP04204T**
Sl. No.	**Module Details**	**Theory Hours 40**
1	Magnetic Circuits	2h
2	Electromagnetism And Induction	2h

3	Transformer	7h
4	D.C Generator	6h
5	D.C Motor	6h
6	A.C Generator	2h
7	A.C Motor (Induction Motor)	5h
8	Induction Motor	7h
9	Special Purpose Motor	3h

Semester - 2	**Module Name: Digital Electronics - 1**	**Module code: CP04205T**
Sl. No.	**Module Details**	**Theory Hours 60**
1	Introduction To Digital Electronics	3h
2	Number Systems and Code Conversions	10h
3	Logic Gates	9h
4	Boolean Algebra and Boolean Function Implementation	9h
5	Combinational Logic Circuits	16h
6	Timers and Timing Circuits	7h
7	Integrated Logic Families	6h

Semester – 2	**Module Name: Employability Skills**	**Module Code: CP04211T**
Sl. No	**Module Details**	**Theory Hours 30**
1	Becoming a Professional in 21st Century	10h
2	English skills	10h
3	Communication skills	10h

Semester - 2 Module Name: Analog Electronics –1 Lab Module code: CP04206P		
Sl. No.	**Module Details**	**Practical Hours 60**
1	Half wave rectifier with capacitor filter	4h
2	Centre tap full wave rectifier with capacitor filter	4h
3	Bridge full wave rectifier with capacitor filter	4h
4.1	Basic Gates: - AND & OR GATE	2h
4.2	Peak Detector	
5	Clippers	4h
6	Clampers	4h
7	Voltage Doublers	2h
8	Transistor characteristics in CE configuration	4h
9	Common Emitter Amplifier- DC and AC analysis	4h
10	Cascaded CE-CE amplifier	4h
11.1	Common Collector Amplifier	4h
11.2	Emitter follower Voltage Regulator	
12.1	Darlington amplifier	4h
12.2	Square wave testing	
13	Transistor as switch	4h
14	NPN Current mirror	4h
15	FET characteristics	4h
16	MOSFET characteristics	4h

Semester - 2	**Module Name: Electrical Engineering –2 Lab**	**Module code: CP04207P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	Electrical Lab Safety and Instructions	3h
2	Control panel wiring	3h
3	Experiments to understand the electromagnetic induction	3h
4	Experiment to learn step up and step down of the transformer	3h
5	Transformer ratio, polarity test and measurement of internal resistance	3h
6	Open circuit test and short circuit test on transformers	3h
7	Load test on single phase transformer	3h
8	Three phase transformer connection	3h
9	Experiment to build a simple Motor	3h
10	Study of main Parts of a DC machine	3h
11	Experiments to learn the speed control of D.C motor	3h
12	Experiment to learn the torque characteristics of D.C Motor	3h
13	Identification of parts and terminals of AC Machines and measurement of internal resistance	3h
14	Familiarization of motor control accessories	3h
15	Direct online starting of a 3-phase induction motor forward and reversal condition	3h
16	Starting of 3 phase induction motor with on delay timer	3h
17	Automatic operation of two three phase induction motor	3h
18	Star delta starting of 3 phase induction motor.	3h
19	Starting of 3 phase Induction Motor by Auto transformer	3h
20	Familiarization of Diesel Generator (DG)	3h

Semester - 2	**Module Name: Digital Electronics –1 Lab**	**Module code: CP04208P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	Familiarization of Logic gate IC's a) 7404 b) 7408 c) 7432 d) 7400 e) 7402 f) 7486	2h

2	Implementation of NOT, AND, OR, NOR, EX-OR & EX-NOR using NAND gate.	4h
3	Implementation of NOT, OR, AND,NAND, EX-OR & EX-NOR using NOR gate	4h
4.a	Simplify and Design SOP Expressions using Boolean Rules & Laws.	2h
4.b	Simplify and Design POS Expressions using Boolean Rules & Laws.	
5.a	Simplify and Design SOP Expressions using K-map method.	2h
5.b	Simplify and Design POS Expressions using K-map method.	
6.a	Implement Binary to Gray Code Converter using K-map method.	2h
6.b	Implement Gray Code to Binary Converter using K-map method.	
7	Design and Implement Half Adder and Full Adder circuits.	3h
8	Design and Implement Half Subtractor and Full Subtractor circuits.	3h
9	Implement 4-bit Parallel Adder & Parallel Subtractor using IC 7483.	4h
10	Design & Implement 1-bit Magnitude Comparator using Basic Gates.	2h
11	Implement 4-bit Comparator using IC 7485.	2h
12	Familiarization of Priority Encoder IC 74147 & Decoder IC 74138.	4h
13	Familiarization of MUX IC 74153 (4:1) & IC 74151 (8:1).	4h
14	Familiarization of DEMUX IC 74139 (1:4) & IC 74138 (1:8).	4h
15	Design & Implement 3-bit Odd Parity Generator & Checker using IC 7486.	4h
16	Design & Implement 3-bit Even Parity Generator & Checker using IC 7486	4h
17	Design & Implement a Monostable Multivibrator using IC 555.	2h
18	Design & Implement an Astable Multivibrator using IC 555.	2h
19	Familiarization of Retriggerable Monostable IC 74122 & IC 74123.	4h
20	Familiarization of Non-Retriggerable Monostable IC 74121.	2h

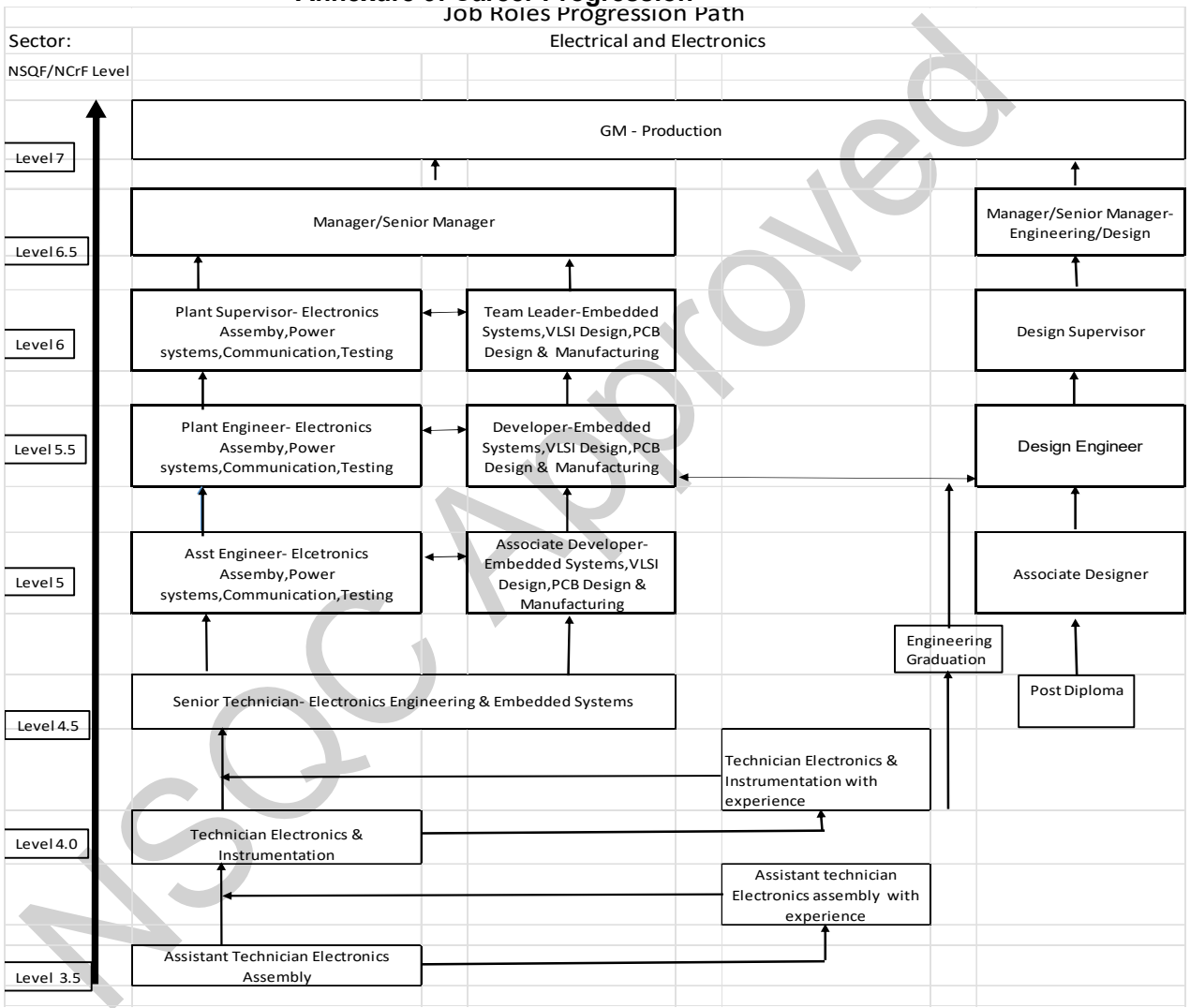
Semester - 2	**Module Name: Workshop 2 Practical**	**Module code: CP04209P**
Sl. No.	**Module Details**	**Practical Hours 40**
1	Introduction to machines- lathe, Milling, Surface grinding (i.e., Introduction to all operations in the machine.)	20h

2	Sheet metal exercise should include - Screwing to produce the threads in the sheet. Drilling Riveting (aluminum rivet)	20h

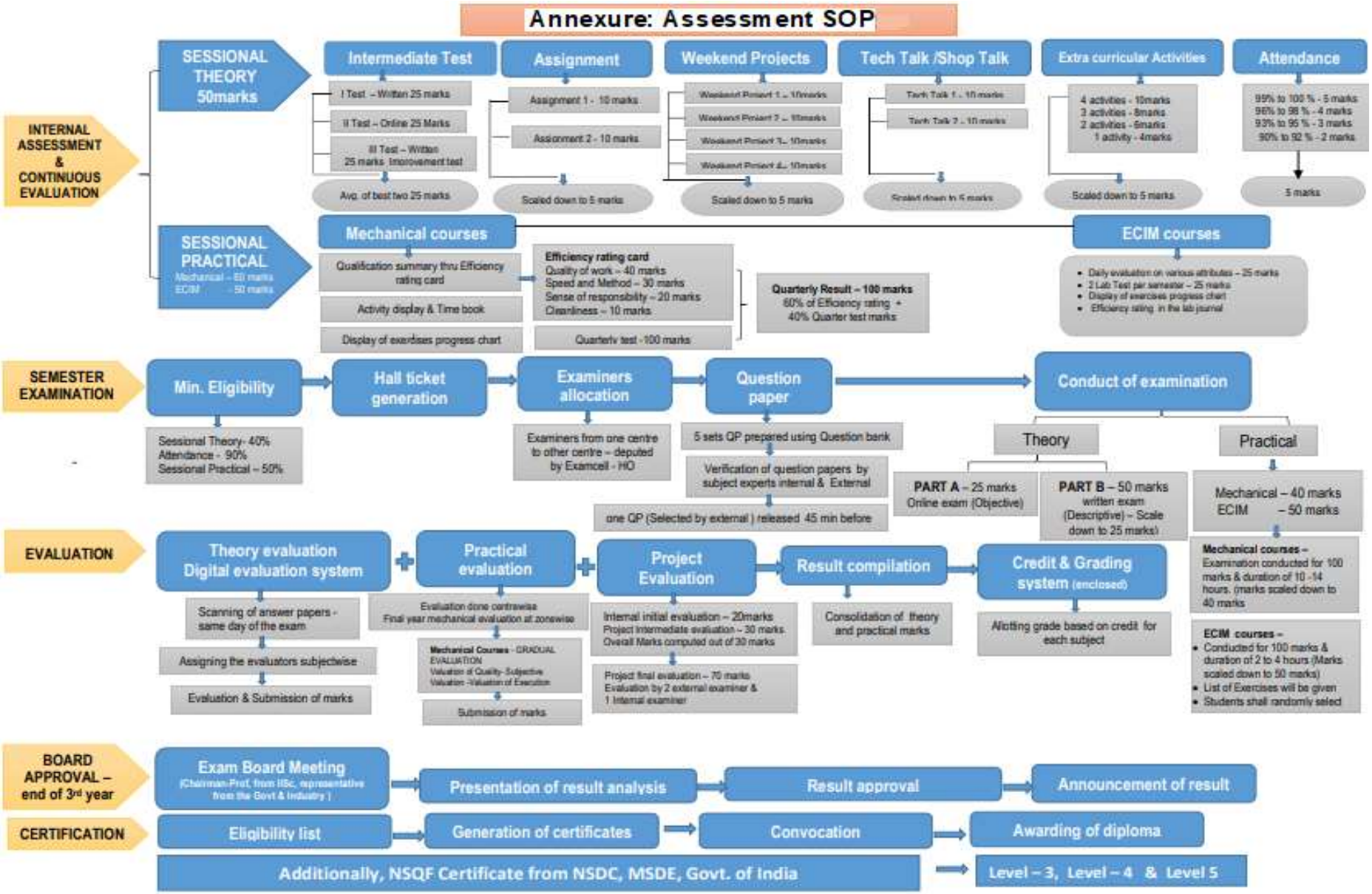
Semester - 2	**Module Name: Electrical Drawing Lab**	**Module code: CP04210P**
Sl. No.	**Module Details**	**Practical Hours 50**
1	Introduction about Autodesk Eagle	2.5h
2	Draw the Symbols Used in Electrical Circuits – Access, search & Updating Library • Ohms law-based circuit • KCL & KVL based Circuit. • DC relay to switch ON a bulb	5h
3	Draw the Connection of Motor Starter Star/Delta motor starter Autotransformer motor starter	5h
4	Draw the Electrical Wiring Diagram (House Wiring) Tube Light 2 Way Switch	5h
5	Draw the Electrical Wiring Diagram of Distribution Board	5h
6	Draw the Single Line Diagram of (11KV/440V, 110KV/11KV and 220KV/33KV Substation)	7.5h
7	Draw the Power and Control Circuit for Single Phase Transformer Panel	5h
8	Draw the Power and Control Circuit for Three Phase Transformer Panel	5h
9	Draw the Power and Control Circuit for Three Phase Induction Motor Panel	10h

Semester - 2	**Module Name: OJT**	**Module code: CP15212P**
Sl. No	**Module Details**	**Practical Hours 90**
1	OJT- On the Job Training in the Industry	90h

Annexure 9: Career Progression



Annexure: 10


Annexure: Assessment SOP
INTERNAL ASSESSMENT & CONTINUOUS EVALUATION
SESSIONAL THEORY 50marks
Intermediate Test
I Test – Written 25 marks
II Test – Online 25 Marks
III Test – Written 25 marks Improvement test
Avg. of best two 25 marks
Assignment
Assignment 1 - 10 marks
Assignment 2 - 10 marks
Scaled down to 5 marks
Weekend Projects
Scaled down to 5 marks
Tech Talk /Shop Talk
Scaled down to 5 marks
Extra curricular Activities
4 activities - 10marks
3 activities - 8marks
2 activities - 6marks
1 activity - 4marks
Scaled down to 5 marks
Attendance
95% to 100 % - 5 marks
90% to 94 % - 4 marks
85% to 89 % - 3 marks
80% to 84 % - 2 marks
5 marks
SESSIONAL PRACTICAL
Mechanical – 50 marks
ECIM – 50 marks
Mechanical courses
Qualification summary thru Efficiency rating card
Activity display & Time book
Display of exercises progress chart
Efficiency rating card
Quality of work – 40 marks
Speed and Method – 30 marks
Sense of responsibility – 20 marks
Cleanliness – 10 marks
Quarterly test - 100 marks
Quarterly Result – 100 marks
60% of Efficiency rating +
40% Quarter test marks
ECIM courses
Daily evaluation on various attributes – 25 marks
2 Lab Test per semester – 25 marks
Display of exercises progress chart
Efficiency rating in the lab journal
SEMESTER EXAMINATION
Min. Eligibility
Sessional Theory- 40%
Attendance - 90%
Sessional Practical – 50%
Hall ticket generation
Examiners allocation
Examiners from one centre to other centre – deputed by Examcell - HO
Question paper
5 sets QP prepared using Question bank
Verification of question papers by subject experts internal & External
one QP (Selected by external) released 45 min before
Conduct of examination
Theory
PART A – 25 marks
Online exam (Objective)
PART B – 50 marks
written exam
(Descriptive) – Scale down to 25 marks)
Practical
Mechanical – 40 marks
ECIM – 50 marks
Mechanical courses –
Examination conducted for 100 marks & duration of 10 -14 hours. (marks scaled down to 40 marks
ECIM courses –
Conducted for 100 marks & duration of 2 to 4 hours (Marks scaled down to 50 marks)
List of Exercises will be given
Students shall randomly select
EVALUATION
Theory evaluation Digital evaluation system
Scanning of answer papers - same day of the exam
Assigning the evaluators subjectwise
Evaluation & Submission of marks
Practical evaluation
Evaluation done centrewise
Final year mechanical evaluation at zonewise
Mechanical Courses - GRADUAL EVALUATION
Valuation at Quality- Subjective
Valuation -Valuation of Execution
Submission of marks
Project Evaluation
Internal initial evaluation – 20marks
Project Intermediate evaluation – 30 marks
Overall Marks computed out of 30 marks
Project final evaluation – 70 marks
Evaluation by 2 external examiner & 1 Internal examiner
Result compilation
Consolidation of theory and practical marks
Credit & Grading system (enclosed)
Allotting grade based on credit for each subject
BOARD APPROVAL – end of 3rd year
Exam Board Meeting
(Chairman-Prof, from IISc, representative from the Govt & Industry)
Presentation of result analysis
Result approval
Announcement of result
CERTIFICATION
Eligibility list
Generation of certificates
Convocation
Awarding of diploma
Additionally, NSQF Certificate from NSDC, MSDE, Govt. of India
Level – 3, Level – 4 & Level 5

Annexure 11: Occupational Map

Occupational Map - Sector Name: Electrical & Electronics

As per NCrF		As per NCO-2015	Sub-Sector 1/Automotive, Aerospace, Home appliances, Textile, Construction machinery	
NCrF Level (1-8)	**Level Descriptors**	**NCO-15 -- Family (First 4 digits code/s for the given level crosscutting the OM Sub-Sectors/Occupations)**	**Occupation** 1/Electronics System design and Manufacturing	**Occupation 2**/VLSI & Embedded System Design and Development
Level 8	**1.** Professional Theoretical Knowledge: **Mastery of knowledge / Innovation driven/ Comprehensive knowledge 2. Professional and Technical Skills/ Expertise: Most advanced Technical and Managerial skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Significant authority, transformational leadership, Social intelligence 4. Broad Learning Outcomes: Lead large transformational projects 5. Responsibility: Business Vision Chairperson/ Board Member / CMD**	1120	Managing Director	Managing Director
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 GM/ CEO / CXO, etc.)**	1321 2151	GM -Production/ System Development/ Entrepreneur	GM -Production/ System Development/ Entrepreneur

Level 6.5	**1.** Professional Theoretical Knowledge: A**dvanced 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**	1223 2151	Manager/Senior Manager- Electronics Assembly, Power Systems, communication, testing, Development Manager - Embedded Systems, VLSI Design, PCB Design & Manufacturing.)	Manager/Senior Manager- Engineering Design
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, selfmanagement 4. Broad Learning Outcomes: Judgement / decision making – specialized 5. Responsibility: Team leader – Junior technical supervisor, Technical supervisor or junior/ deputy manager**	1223 2151 2152	Plant Supervisor - Electronics Assembly, Power Systems, communication, testing, Team Leader Development - Embedded Systems, VLSI Design, PCB Design & Manufacturing.	Design Supervisor
Level 5.5	**1.** Professional Theoretical Knowledge: **Specialized knowledge 2. Professional and Technical Skills/ Expertise: Specialized skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Team readiness, self-entrepreneurship readiness 4. Broad Learning Outcomes: Specialized/ complex jobs/tasks 5. Responsibility: Self and team responsibility – Sr. Technician or Master Technician**	2152 3114 3122	Plant Engineer - Electronics Assembly, Power Systems, communication, testing, Developer - Embedded Systems, VLSI Design, PCB Design & Manufacturing.	Design Engineer
Level 5		2152 3114 3122 2512	Assistant Engineer - Electronics Assembly, Power Systems, communication, testing, Associate Developer - Embedded Systems, VLSI Design, PCB Design & Manufacturing.	Associate Designer

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 & Enterpreurial readiness 4. Broad Learning Outcomes: Carry out Range of tasks and may provide range of solutions 5. Responsibility: Accountable/ responsible - Jr. Technician & Technician**	2152 3114 3122 2512	Senior Technician-Electronics Engineering & Embedded Systems, Circuit Analyst, System validator	Study Post Diploma, System validator, Embedded programmer and tester
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: Team member/follows instructions 4. Broad Learning Outcomes: Carry out Range of tasks with minimum supervision 5. Responsibility: Accountable/ responsible - Jr. Technician & Technician**	3114 7311	Technician Electronics & Instrumentation, PCB and circuit tester, Sensor testing and calibration	Embedded programmer, Embedded system tester, Maintenance of embedded systems
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: Team member/follows instructions 4. Broad Learning Outcomes: Carry out Range of tasks with minimum supervision 5. Responsibility: Accountable/ responsible - Jr. Technician & Technician**	3114	Assistant Technician-Electronics assembly, Circuit assembler Assembly and Fitting	Circuit tester, Circuit test equipment operator, Circuit assembler

Annexure 12: Key Learning Outcome

SL NO	MODULE NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL & PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
FIRST YEAR				
1	**Communication: English - 1 (CP04101T)** **Communication: English - 2 (CP04201T)** Ability to communicate effectively	Understand, comprehend grammar. Formation of simple sentences.	Communicate with peers. Writing skills - Internal and Organizational correspondence, technical writing. Develop Presentation Skills.	Write Business Letters Reports as necessary in Profession. Interact, Communicate during Interviews, debates and Group Discussion for Career Development. Public Speaking.
2	**Applied Mathematics -1 (CP04102T)** **Applied Mathematics -2 (CP04202T)** Ability to solve various mathematical problems	Basic Algebra. Linear and quadratic equations.	Use of Trigonometry, Matrices and determinants, differential and Integral calculus for solving Technical and Engineering problems.	Apply Statistics in Interpreting Data. Graphical representation of Data. Use appropriate units and measurements during interactions and discussions in the work area.
3	**Applied science (CP04103T)** **Applied science Lab (CP04106P)** Understanding various physical quantities, conservation and transfer of different forms of energy	Interpret Different systems of Units and convert from one unit to another. Industrial Chemistry.	Describe Physical Law governing Translatory and Rotational Motions. Evaluating Work, Power, and Energy.	Application of Physical laws, Fluid Dynamics, concepts of Heat, and measurement in the work area. Various energy sources and conservation of energy. Renewable energy sources.

4	**Electronics – 1 (CP04104T)** **Electronics - 1 Lab (CP04107P)** Understanding different electronic components and their characteristics	Understand Types, Parameter, Characteristics, Configuration of Diodes Introduction to wave shaping circuits- Clipper, clamper, Peak detector etc. Identify Passive and Active Components their Symbols, Specification and explain their Characteristics and Applications	Handle Multimeter, Power supply, Function Generator and CRO Design Different Types of Rectifier Circuits Zener diode applications- voltage regulation	Application of laws governing electronic circuits (Ohm's law), solving problems, voltage and current divider circuits application Soldering and de-soldering techniques, Safety procedure to be followed and best practices
5	**Electrical Engineering -1 (CP04105T)** **Electrical Engineering -2 (CP04204T)** **Electrical Engineering - 1 Lab (CP04108P)** **Electrical Engineering - 2 Lab (CP04207P)** Analysing different AC and DC circuits, understanding, functioning and controlling Electrical Machines.	Distinguish between charge, current, potential difference, emf, Power and Energy Will be Aware of Electrical Safety Procedures Identify Electrical hand tools. Identify and Understand Electrical Safety Symbols Explain AC Fundamentals, Parameters of ac waveform. Classify Different power sources and their applications. Explain Purpose of Earthing and Different Types of Earthing Explain and Differentiate Different methods of power generation.	State Specification and Applications of Electrical hand tools Identification and specification of Electrical Components Like Wires, Switches, Sockets, Plug, Switches, Fuse, MCB, ELCB Explain Single Phase AC Circuits and their parameters (power factor, active reactive, Apparent Power, R-L-C Circuits) Rig up Single Phase AC Circuits Explain Three Phase AC Circuits, comparison and advantages of Three phase AC Circuits, Phase difference, Delta and Star Configurations and applications. Rig up Three Phase AC Circuits	Follow all prescribed safety practices in the lab. Use basic Electrical and Magnetic Laws in the electrical circuits. Handle Electrical Measuring Instruments Apply network theorems – node/mesh analysis, KCL, KVL, Superposition theorem. Perform Single Phase Electrical Wiring for Lights and Other Appliances Circuits Identify different faults in an electric circuit and rectify them. Identify and Select appropriate protective devices (fuse and their types, circuit breakers and their types, Relay and their types)

		Explain Types, Construction, Functioning and Applications of Single and Three Phase Transformers Explain the Characteristic of Three Phase Induction Motor Explain Working Principle of Brushless D.C Motor, Stepper Motor, Servo Motor and PMSM Motor	Determine the Efficiency and Losses of transformer. Determine Efficiency and Losses in DC Generator Rig Circuit to Start and Regulate the Speed of DC Motor Differentiate between AC Generator and DC Generator Draw Circuits for the Operation of Single-Phase Induction Motor and Three Phase Induction Motor	Earthing and conditions. Starting, Controlling and testing of AC and DC Machines.
6	**Analog Electronics I (CP04203T)** **Analog Electronics I Lab (CP04206P)** Understanding different electronic components and their characteristics and analysis of simple circuits.	Understand Types, Parameter, Characteristics, Configuration of BJT, FET and MOSFET Knowledge on wave shaping circuits- Clipper, clamper, Peak detector etc. Distinguish between BJT and JFET Understand small signal amplifier their characteristics and frequency response. To understand the Working, Connection and applications of Opto-electronics Devices Explain the Characteristics of Op-amp, symbol and applications- Differential	Construction, working and applications of Differential amplifier (inverting & non-inverting), NPN & PNP current mirror. Design the different amplifiers. Perform ac and dc analysis of electronic circuits. Design and troubleshooting of electronic circuits.	Use of ESD Identify the components & read and comprehend the datasheet. Design and troubleshooting of electronic circuits. Follow safety practices in the Lab.

		amplifier, current mirrors		
7	**Digital Electronics – I (CP04205T)** **Digital Electronics – I Lab (CP04208P)** Understanding different logical operations, applying and analyzing Digital circuits and components in simple applications.	Understand the Number system, its conversion and applications. Differentiate Analog Signals & Digital Signals Understand Logic Gates, Symbol, Boolean Expression and Truth Table	Construct and verify different Digital Logic Circuits. [Logic Gates, half & full adder, MUX, DEMUX, Encode and Decoder] Implementation of Logic Gates using Universal Gates Analyse, design and implement combinational logic circuits. Analyse, design and implement modes of timer.	Simplify and Design SOP/POS Expressions using Boolean Rules & Laws Design logical circuits using logic gates.
8	**Engineering Drawing/ Fusion 360 (CP04109P)** Ability to create Engineering Drawing through CAD software Application.	Describe the difference between first and third angle projection method. Differentiate orthographic and isometric projection. Explain the different types of sectioning and draw sectional views	Explain the different methods of geometric construction. Explain the types, uses and application of scale, lines, drawing sheet, layout, title block. Describe the Designing Procedure (Sketching & Modelling) Create and plot assembly and detail views of geometrical in 3D Modelling	Dimensioning Draw Orthographic projection, Isometric drawing, different types of sectioning and draw sectional views. Will be able to draw the Two-dimensional (2D) and three dimensional (3D) diagrams as per given dimensions using Fusion 360. Create and plot assembly and detail views of geometrical in 3D Modelling. Perform CAD application in 2D modelling

9	**Workshop -1 (CP04110P)** **Workshop -2 (CP04209P)** Understanding the safety and ability to operate the conventional machines.	Describe and explain the classification, selection and use of hand tools.	Describe the construction, classification and function of job holding devices. Describe the construction and functioning of cutting Tools and use them in the machining process conventional.	Follow all safety precautions prescribed for workshop operations Read and interpret the Workshop drawings. Perform different operations on the assigned job to achieve defined Specifications and dimensions.
10	**Computer LAB (CP04111P)** Creation of various reports and documentations using MS Office.	Identify the components of a computer system and demonstrate basic proficiency in commonly used applications.	Prepare presentation and report on computer system. Create, design, and produce professional documents using word processing software (i.e., MS Word). Process, manipulate, and represent numeric data using the basic functions of spreadsheet software (i.e., MS Excel). Installation of OS, Personalisation of PC, and other maintenance tools.	Demonstrate and apply strategies for merging and integrating source data from multiple applications.
11	**Electrical Drawing Lab (CP04210P)** Ability to draw electronic circuits using Eagle software.	Understand the symbols of Electrical components. Draw the Electrical circuits	Draw the Electrical Diagram of Distribution Board Access, search & Updating Library Draw the Power & Control Circuit	Select the components as per the application and draw the Circuit using software

12	**Employability Skills (CP04112T) (CP04211T)** 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 the HRP with peer groups to maintain healthy relationship. Practice the constitutional values in the society. Being ethical and moral in the society following all the fundamental duties in the society. Practice effective communication with the 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.

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