



QUALIFICATION FILE

Assistant Technician – Automation

- ☐ 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 -Automation								
2.	Sector/s	Capital Goods and Manufacturing								
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 -Automation						
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-CG-01038-2023-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	Identify the Electrical safety and protective devices. Use of right equipments, modes and ranges for measuring Electrical parameters. Ability to create Technical Drawings. Ability to retrieve necessary technical details from the Internet. The subjects covered in this program are – English Communication, Engineering Mathematics, Manufacturing Technology – I, Electrical and Electronics, Engineering Drawing, Mechanical Workshop, Electrical and Electronics Lab, Computer Lab – CAD, Modern Shop Floor Practices, Analog Electronics, Digital Electronics, Metrology, Basics of Computers, Analog Electronics Lab, Digital Electronics Lab, Basics of Computers Lab, OJT, Employability Skills								
9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	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</td> <td>NA</td> </tr> </tbody> </table>			Sl. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization)	1	Minimum 10 th Pass	NA
Sl. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization)								
1	Minimum 10 th Pass	NA								
10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	Total Credits – 42	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 <i>(Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</i>	☐ Offline ☐ Online ☒ Blended					
		Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)
		Classroom (offline)	235	150	720	NIL	1105
		Online	155				155
(Refer Blended Learning Annexure for details)							
14.	Aligned to NCO/ISCO Code/s <i>(if no code is available mention the same)</i>	NCO Code – 2015.3114.0100, 2015.7311.0101, 2015.2141.0200, 2015.7412.0101					
15.	Progression path after attaining the qualification <i>(Please show Professional and Academic progression)</i>	Academic Progression: Advance Certificate – Technician Industrial Control and Instrumentation					
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 (10% seats are reserved)					
20.	Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)	☒ Yes ☐ No Safety Health and Environment Module Code: CP36604T					
21.	Is Qualification Suitable to be Offered in Schools / Colleges	Schools ☐ Yes ☒ No Colleges ☐ Yes ☒ No					
22.	Name and Contact Details of Submitting / Awarding Body SPOC <i>(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</i>	Name: Mr. R Rajagopalan Position in the Organization: Joint Managing Director Email: rg@nttf.co.in Tel number: 080 – 28390215 Contact No.: 9844013448 Website: nttftrg.com					
23.	Final Approval Date by NSQC: 29 Sep 2023	24. Validity Duration: 3 years			25. Next Review Date: 29 Sep 2026		

Section 2: Module Summary

Modules/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 (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	English Communication	CP36101T	Core	3.5	21	30	-	-	-	30	75	-	-	25	100	
2	Engineering Mathematics	CP36102T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
3	Manufacturing Technology – I	CP36103T	Core	3.5		45	-	-	-	45	100	-	-	-	100	
4	Electrical and Electronics	CP36104T	Core	3.5		45	-	-	-	45	100	-	-	-	100	
5	Engineering Drawing	CP36105P	Core	3.5		-	30	-	-	30	-	75	-	25	100	
6	Mechanical Workshop	CP36106P	Core	3.5		-	20	-	-	20	-	75	-	25	100	
7	Electrical and Electronics Lab	CP36107P	Core	3.5		-	20	-	-	20	-	75	-	25	100	
8	Computer Lab – CAD	CP36108P	Core	3.5		-	20	-	-	20	-	75	-	25	100	
9	OJT	CP36109P	Core	3.5		-	-	360	-	360	-	75	-	25	100	
10	Employability Skills	CP36110T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
Duration (in Hours)/ Total Marks					21	180	90	360		630	475	375	-	150	1000	
Semester – 2																
12	Modern Shop Floor Practices	CP36201T	Core	3.5	21	30	-	-	-	30	100	-	-	-	100	
13	Analog Electronics	CP36202T	Core	3.5		60	-	-	-	60	100	-	-	-	100	
14	Digital Electronics	CP36203T	Core	3.5		45	-	-	-	45	100	-	-	-	100	
15	Metrology	CP36204T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
16	Basics of Computers	CP36205T	Core	3.5		15	-	-	-	15	100	-	-	-	100	
17	Analog Electronics Lab	CP36206P	Core	3.5		-	20	-	-	20	-	75	-	25	100	
18	Digital Electronics Lab	CP36207P	Core	3.5		-	20	-	-	20	-	75	-	25	100	
19	Basics of Computers Lab	CP36208P	Core	3.5		-	20	-	-	20	-	75	-	25	100	
20	OJT	CP36209P	Core	3.5		-	-	360	-	360	-	75	-	25	100	

21	Employability Skills	CP36210T	Core	3.5		30	-	-	-	30	100	-	-	-	100	
Duration (in Hours)/ Total Marks					21	210	60	360		630	600	300	-	100	1000	
Total hours					42	390	150	720		1260	1075	675		250	2000	

Elective Modules/ NOS/s: NA

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																

Optional Modules/ NOS/s: NA

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

Assessment - Minimum Qualifying Percentage: Please specify **any one** of the following:

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

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

Section 3: Training Related

1.	Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	Diploma in relevant field with 3 years as trainer or industry experience B. Tech or BE with 2 years of trainer or industry experience
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	Diploma in relevant field with 5 years as trainer or industry experience B. Tech or BE with 5 years of trainer + industry experience
3.	Tools and Equipment Required for Training	☒ Yes ☐ No (If "Yes", details to be provided in Annexure)
4.	In Case of Revised Qualification, Details of Any Upskilling Required for Trainer	NA

Section 4: Assessment Related

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

Section 5: Evidence of the need for the Qualification*Provide Annexure/Supporting documents name.*

1.	Research Reports: The following reports establish the Resource requirement for skill encompassed in Industrial automation/Mechatronics Engineering for the Manufacturing, Capital Goods and Automotive Industries. a. MSDE Annual Report 2021- 22 predict very high growth on Auto sector, Food processing, Electronics and IT Hardware, Pharmaceuticals, Health care, Communication in India. b. MSDE/ NSDC Human Resources and Skill Requirements in the Auto and Auto Components Sector report (2013- 2017 2017 – 2022) The Report Forecast a Higher growth in Automotive Manufacturing, Automotive Components Manufacture Sector c. Annual reports 2021 – 22 of Ministry of Heavy Industries Government of India The above Studies has found Higher growth in Manufacturing, Capital Goods and Automotive Industries which will require Qualified Technicians in Industrial Automation/Mechatronics Engineers.
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, Pharma and Health care sector. 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. c. The Study has found Industrial Automation, Embedded System Developers, 3D Printing Technician has new job roles emerging in Engineering and Manufacturing sectors.
4.	Number of Industry validation provided: 7
5.	Estimated nos. of persons to be trained and employed: 5000 / 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 and 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 and 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) (Annexure 8)
11.	Supporting Document: Career Progression (Mandatory – Public view)	Yes (Annexure 9)
12.	Supporting Document: Assessment SOP (Mandatory)	Yes (Annexure 10)
13.	Supporting Document: Occupational Map (Mandatory)	Yes (Annexure 11)
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	Explain Electrical safety. Practice Basic Engineering Mathematics. Explain the operating procedures of different Electronics and Electrical measuring tools and equipments. Describe the functions of basic Electronics components. Explain protective devices used in circuits. Explain DC sources, Single phase and three phase AC Sources. State and explain laws governing Electrical and Electronics Circuits. Explain the types of wires & its selection Explain the need of Engineering drawing Knowledge & understanding of Number systems, codes, Logic gates, logical circuit reduction techniques, combinational and Sequential circuits	Identify the Electrical safety and protective devices. Perform Mathematical calculations related to Electrical and Electronics Use of right equipments, modes and ranges for measuring Electrical parameters. Identify the Electronics components. Read Data Sheets of Electrical and Electronics components. Application of Laws to analyse Electrical and Electronics circuits. Identify and troubleshoot simple electrical circuits. Identification of Wires, connectors and testing and harnessing of wires Application of drawing standards, types of projections, drafting, dimensioning, drawing interpretation Identify, analyse and trouble shoot different Logical circuits.	3.5

Professional and Technical Skills/ Expertise/ Professional Knowledge	Able to read the circuit diagrams, identify the Electrical and Electronic components and their values. Draw mechanical and Electrical drawings and interpret them. Use Mechanical and Electrical Hand tools. Explain the soldering process Explain the importance of Metrology in industry. Exhibit and maintain a safe working environment and good housekeeping practices Operate conventional machine tools.	Perform different types of Electrical wirings. Assembling of Electronics components for product manufacturing. Perform simple machining operations. Selection, Identification and testing of Power Devices. Demonstrate principles of measurement, operation of measuring instruments, selection and use.	3.5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Describe good behaviour and work ethics. Explain 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, and write official / personal communication to the superiors.	3.5

Broad Learning Outcomes/Core Skill	Describe Electrical and Electronics components and equipments. List out the measuring tools, explain the operating procedure, Specify the safety and best practices followed in the work area. Explain the assembling, mounting, soldering techniques in an assembly line. Describe the functioning of basic mechanical tools, equipments and measuring devices. Interpret Mechanical and Electrical drawings. Specify the types and gauges of wires. List and explain different protective devices, wiring practices. Prepare Technical Reports and Presentations using MS office Prepare emails for correspondence. Use Internet to get additional Technical Information	Application of skills in the Electrical/ Electronic assembly for manufacturing. Basic troubleshooting of simple Electrical and Electronics circuits and domestic wiring appliances. Ability to create Technical Drawings. Ability to make technical reports and Presentation using MS Office. Correspond through emails. Ability to retrieve necessary technical details from the Internet.	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. 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

SL. NO.	NAME OF THE TOOL AND EQUIPMENT	SPECIFICATION	QUANTITY
1	Digital Oscilloscope	No of Channels - 2, Bandwidth: DC - 20 MHz	03
2	Dual - Power Supplies Regulated Power Supply, Adjustable	0-30V/1A	03
3	Function Generator	Frequency Range: 0.3 Hz to 3 MHz, Functions: Sine, Square, Triangle, DC Sweep	03
4	Pulse Generator	20MHz	02
5	Soldering Station - Temperature Controllable		01
6	LCR - Q Bridge		01
7	IC Tester (for Digital IC's)		01
8	Digital Trainer Kit	Fixed +5V/ 1Amp, 16pin ZIF Socket, Logical switch with I/O Indicators, 4mm patch cords with short circuit and Overload Protection.	03
9	Soldering Iron	20W	02
10	Fuse	HRC 16A with Holders	03
11	MCB	2 pole, 10A/9kA, C type	03
12	Crimping tool		01
13	AC Drive / VFD		01
14	DC Drive		01
15	Force measuring system	Load Cell 20 kg With Instrumentation Amplifier and Digital Display.	01
16	Digital Temperature Controller	Digital Temperature Controller Compatible to Connect J, K Thermo / Couple and RTD	01
17	Proximity Sensors	Inductive, Capacitive and Optical Proximity Sensor	01each
18	PLC Trainer Kit with HMI SCADA	CPU, 24VDC Supply, Onboard IO- 14, DI 24V, 10 DO relay 0.5A, 2 AI 0-10 VDC, Power Supply AC 85VAC – 264VAC @47 to 63 Hz, program memory 64 KB.	02
19	Sensor Trainer Kit with Assorted Sensors		02
20	Compressor	Compressor- Reciprocating Air Compressor - 2 stage/2 Cylinder with 3 phase motor capacity 8CFM, Air Receiver Size- 160l	01

21	Pneumatic Trainer Kit		01
22	Hydraulic Trainer Kit		01
23	Robotic Trainer		01
24	Microcontroller Trainer Kit	8051 /AT89S52 Development Board with Interfacing Modules.	03
25	IoT Trainer Kit		01
26	PIC Development Board	16F877A Board with Interfacing modules	03
27	PIC Kit 3		01
28	Pneumatic Simulation Software -10 User		01
29	Hydraulic Simulation Software - 10 User		01
30	PLC Simulation Software - 10 User		01
31	Robot Simulation Software -10 User		01
32	Computer		10
MECHANICAL TOOLS			
33	Workbench with Lockers - 4 Vices/Bench	1.5mX0.8mX0.7m	03
34	Bench Vice	125mm	10
35	Set of files		10
36	Vernier caliper	150mm, LC 0.02	05
37	Micrometer (External)	0-25mm	03
38	Bevel Protractor		02
39	Radius Gauge	up to 7.5mm	02
40	Feeler Gauge	13 leaves150mm long	02
41	Scriber		05
42	Centre Punch	60° & 90°	05
43	Try Square	100 mm x 75 mm	10
44	Hack Saw with Blade	300 mm	10
45	Hammer	500 g	03

46	Cast Iron Surface Plate	600mm X 450mm with Stand	01
47	Angle Plate	250mm X 150mm X 175mm	01
48	V - Blocks	150mm X 100mm X 60mm	01
49	Vernier Height Gauge	600mm	01
50	Nose plier	Long Nose – 170mm	01
51	Screwdriver Set		01
52	Allen Key Set (mm sizes)		01
53	Adjustable Spanners	70/ 30	01
54	Bench Drilling Machine with Accessories	0-12mm	01
55	Power hacksaw	350 mm	01
56	CNC Lathe machine with Accessories and Servo Stabiliser		01
57	CNC Milling machine with Accessories and Servo Stabiliser		01
58	CNC Simulation Software	10 user license	01
59	Compressor	Compressor- Reciprocating Air Compressor - 2 stage/2 Cylinder with 3 phase motor capacity 8CFM, Air Receiver Size- 160l	01
Equipment's / Machineries available where OJT is being conducted			

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. Black / White board
2. Projector with screen / Display TV
3. Laptop / Computer

Annexure 3: Industry Validations Summary

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

Sl. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile
1	Tata Motors Limited, Pune	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229
2	Tata Motors Limited, Jamshedpur	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229
3	Tata Motors Limited, Lucknow	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229
4	Tata Motors Limited, Pantnagar	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229
5	Tata Motors Limited, Dharwad	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229
6	Tata Motors Passenger Vehicles Limited, Pune	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229
7	Tata Motors Passenger Vehicles Limited, Sanand	Rajiv Ranjan	Dy. GM-Human Resources	Tata Motors Passenger Vehicles Ltd, Sector 15 & 15A, PCNTDA, Chikhali, Pune 411062	77810164 51	rajiv.ranjan@tatamotors.com	www.linkedin.com/in/rajiv-ranjan-a769229

Annexure 4: Training and 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	7500	More than 12,000	750	More than 2000	-	-
2024	8200	More than 13,000	820	More than 2000	-	-
2025	9000	More than 14,000	900	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	New Qualification, introduced in the year 2023.-								NIL			
	2018 - 2021												
	2019 - 2022												

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: NA**Content availability for 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	75:25
2	Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	Physical classroom, Workshops, Mock sessions, Case study, Role play, Group Discussions, LMS	95:05
3	Showing Practical Demonstrations to the learners	Workshop / Lab, Video recording, Simulators	100:0
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Workshop machines, Lab equipment, Simulators, Mini projects, Project	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	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					
English Communication	Reading comprehension - Exercises	0	-	-	10
	Listening comprehension - Exercises	0	-	-	10
	Construction of sentences - Exercises	25	-	-	-
	Dictionary learning - Practice in referring dictionary	10	-	-	5
	Synonyms and Antonyms	10	-	-	-
	Technical Report Writing	30	-	-	-
	Total Marks	100			
Engineering Mathematics	Basic Arithmetic	10	-	-	-
	Units of Measurements – SI, MKS, FPS Conversion	10	-	-	-
	Mensuration – Area, Volume	15	-	-	-
	Percentage, Ratio and Proportion	10	-	-	-
	Basics of Algebra	15	-	-	-
	Trigonometry – Application in Engineering	20	-	-	-
	Basic Statistics	20	-	-	-
	Total Marks	100			
Manufacturing Technology - I	Safety in workshop	05	-	-	-
	Hand Tools – Files, Marking Tools & Hacksaw.	15	-	-	-
	Drilling Machine, Process, Drills, Work Holding & Tool holding devices	15	-	-	-

	Turning – Types of lathes, turning operation, Work holding and tool holding devices, related calculations	15	-	-	-
	Milling – Types of milling machines, Types of cutters, milling operations, Work holding & Tool Holding devices, Related calculations.	20	-	-	-
	Grinding operations, Work holding & tool holding devices, specifications & applications of grinding wheels.	15	-	-	-
	Understanding Cycle time and Setting time	15	-	-	-
	Total Marks	100			
Electrical and Electronics	Electrical Safety and Protective Devices	10	-	-	-
	Basics of Electricity – Fundamental laws	10	-	-	-
	Hand tools and their usage - Hand tools used in electrical work	10	-	-	-
	Measuring Instrumentation – Types, application	10	-	-	-
	DC Circuits – Parallel & Series circuits	10	-	-	-
	AC Circuits – Single phase & 3 Phase Circuits	10	-	-	-
	DC Power Sources	10	-	-	-
	Electronics Components – Passive & Active components	10	-	-	-
	Electrical Wires, Cables and Connectors	10	-	-	-
	Basics of Soldering	10	-	-	-
	Total Marks	100			
Engineering Drawing	Free hand sketching		5	-	-
	Isometric views and orthographic projection		15	-	-
	Sectional views		10	-	5
	Dimensioning and providing tolerances		10	-	5
	Indicating Surface roughness symbols in Drawing		10	-	5

	Interpreting Geometrical Tolerance		10	-	5
	Electrical Drawing		10	-	5
	CAD Fundamentals		5	-	-
	Total Marks	100			
Employability Skills	Introduction to Employability skills	25	-	-	5
	Behavior skills	25	-	-	5
	Constitutional Values and Citizenship	25	-	-	15
	Total Marks	100			
Mechanical Workshop	Usage of Steel Rule, Measuring Tape, Vernier Caliper, Micrometer, Bevel Protractor and Height Gauge	-	15	-	5
	Usage of Hand Tools - Files, Spanner etc.	-	15	-	5
	Usage of Gauges - Go and No Go, Radius and Feeler Gauges	-	10	-	5
	Filing Practice	-	20	-	5
	Drilling Practice	-	15	-	5
	Total Marks	100			
Electrical and Electronics Lab	Electrical Safety	-	5	-	3
	Identification and use of Electrical tools	-	10	-	5
	Familiarization of Digital Multimeter (DMM)	-	5	-	3
	Familiarization of Power supply, CRO and FG	-	10	-	3
	Electronics Components Identification and testing- Resistor, Capacitor and Inductor	-	10	-	3
	Understanding of Ohm's law, Kirchhoff's law	-	5	-	-
	Transformers – Familiarization, Polarity test	-	5	-	-
	Testing of- Earth Resistance, MCB, Relay	-	5	-	-

	Familiarization Wires (Power cable/Logic cable)	-	5	-	3
	Practice on Crimping	-	5	-	2
	Practice on Wire Harnessing	-	5	-	-
	Soldering Practice	-	5	-	3
	Total Marks	100			
Computer Lab – CAD	Practice on Engineering Drawing	-	50	-	15
	Exercise on CAD Software	-	25	-	10
	Total Marks	100			
OJT	On the Job Training in the relevant sector	-	75	-	25
	Total Marks	100			
Semester -2					
Modern Shop Floor Practices	5S	15	-	-	-
	Gemba	10	-	-	-
	Kaizen	15	-	-	-
	Poka Yoke	15	-	-	-
	Just In Time	15	-	-	-
	Standards followed in Industry	15	-	-	-
	Muda, Mura and Muri	15	-	-	-
	Total Marks	100			
Analog Electronics	Introduction to Semiconductor devices	15	-	-	-
	Diode Characteristics	10	-	-	-
	Diode Circuits	15	-	-	-
	Diode Applications	15	-	-	-
	Transistor – Types, Characteristics	10	-	-	-

	Transistor Application - Specification, Application	15	-	-	-
	Regulated Power supply	20	-	-	-
	Total Marks	100			
Digital Electronics	Introduction to digital electronics	10	-	-	-
	Number systems and codes	20	-	-	-
	Logic gates and Boolean Algebra	20	-	-	-
	Combinational logic circuits	20	-	-	-
	Latches and flip-flops	10	-	-	-
	Sequential Logic Circuits	15	-	-	-
	Types of memory	5	-	-	-
	Total Marks	100			
Metrology	Introduction to Metrology	05	-	-	-
	Linear Measurements, Linear Measuring instruments, Types & Applications	20	-	-	-
	Angular Measurements – Angular measuring instruments, Types & applications	15	-	-	-
	Dial Indicators – Types, Specification, Applications	10	-	-	-
	Gauges – Types, Applications	15	-	-	-
	Slip Gauges – Grades, Applications in Precision measuring	10	-	-	-
	Introduction to Limits and Fits & Tolerance	25	-	-	-
	Total Marks	100			
Basics of Computers	Computer and its peripherals	20	-	-	-
	Basics of MS Word	20	-	-	-
	Basics of MS PowerPoint	20	-	-	-
	Basics of MS Excel	20	-	-	-
	Internet – Accessing, using internet	20	-	-	-
	Total Marks	100			

Employability Skills	Becoming a Professional in 21st Century	25	-	-	5
	English skills - Writing	25	-	-	5
	Communication skills	25	-	-	15
	Total Marks	100			
Analog Electronics Lab	VI characteristics of diode	-	5	-	-
	Half wave rectifier with and without filter	-	5	-	5
	Full wave rectifier with and without filter	-	10	-	5
	Clipper and Clamper circuits	-	10	-	5
	VI characteristics of Zener diode	-	10	-	5
	Transistor characteristics (CE configuration)	-	10	-	-
	Transistor Applications as a Switch, Inverter (NOT Gate)	-	5	-	5
	Power Electronics Components Identification and testing - BJT, MOSFET, IGBT, SCR	-	20	-	-
	Total Marks	100			
Digital Electronics Lab	Familiarization of Logic Gates	-	15	-	5
	Universal Property of NAND, NOR gates	-	15	-	-
	Boolean Algebra	-	10	-	5
	Multiplexer	-	10	-	5
	Demultiplexer	-	10	-	5
	Half adder and Full adder	-	15	-	5
	Total Marks	100			
Basics of Computers Lab	Practice on MS Office - Word, Power Point, Excel	-	50	-	15
	Internet and E-mail	-	25	-	10
	Total Marks	100			
OJT	On the Job Training in the relevant sector	-	75	-	25
	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 and 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 and 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 and 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 and 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 and 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 and 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:

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

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.
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First class	Should have scored CGPA 7.5 to 8.4
Second class	Should have scored CGPA 6.0 to 7.4
Pass class	5.5 to 5.9

8. ASSESSMENT TOOLS

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

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

List of ICT Tools:

Desktop and laptops

Interactive White Board

CCTV Camera

Pen Drive

Video Conferencing

Biometric

Edusquare: NTTF ERP/CRM used for academic purpose Edusquare erp.nttftrg.com used as SaaS (Software as a Service) mode

Networking: Includes Wireless access Points, Switches, Routers, Controllers across all NTTF

AWS Cloud: AWS Cloud computing platform to host NTTF website www.nttftrg.com and used as backup storage.

Firewall: Network security device protecting our network by filtering traffic and blocking outsiders.

Microsoft (O365/M-365) – Email/office (Word, Excel, PPT, One Drive for all staff/students are provided using Microsoft O365 MDM (BYOD) policies implemented through M365 used as SaaS

Annexure 8: Model Curriculum

Semester – 1		Module Name: English Communication	Module Code: CP36101T
Sl. No.	Module Details		Theory Hours 30
1	Reading comprehension – Exercises		4h
2	Listening comprehension – Exercises		4h
3	Construction of sentences – Exercises		5h
4	Dictionary learning		4h
5	Synonyms and Antonyms		5h
6	Technical Report Writing		8h
	Total Hours		30h

Semester – 1		Module Name: Engineering Mathematics	Module Code: CP36102T
Sl. No.	Module Details		Theory Hours 30
1	Basic Arithmetic		2h
2	Units of Measurements		2h
3	Mensuration		5h
4	Percentage, Ratio and Proportion		5h
5	Basics of Algebra		6h
6	Trigonometry		6h
7	Basic Statistics		4h
	Total Hours		30h

Semester – 1		Module Name: Manufacturing Technology - I	Module Code: CP36103T
Sl. No.	Module Details		Theory Hours 45
1	Safety		5h
2	Hand Tools		6h
3	Drilling		6h
4	Turning		10h
5	Milling		8h
6	Grinding		8h
7	Understanding Cycle time and Setting time		2h

	Total Hours	45h
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Semester – 1 Module Name: Electrical and Electronics Module Code: CP36104T		
Sl. No.	Module Details	Theory Hours 45
1	Electrical Safety and Protective Devices	5h
2	Basics of Electricity	5h
3	Hand tools and their usage	3h
4	Measuring Instrumentation	3h
5	DC Circuits	4h
6	AC Circuits	4h
7	DC Power Sources	5h
8	Electronics Components	6h
9	Electrical Wires, Cables and Connectors	5h
10	Basics of Soldering	5h
	Total Hours	45h

Semester – 1 Module Name: Engineering Drawing Module Code: CP36105P		
Sl. No.	Module Details	Practical Hours 30
1	Free hand sketching	2h
2	Isometric views and orthographic projection	6h
3	Sectional views	5h
4	Dimensioning and providing tolerances	3h
5	Indicating Surface roughness symbols in Drawing	3h
6	Interpreting Geometrical Tolerance	4h
7	Electrical Drawing	4h
8	CAD	3h
	Total Hours	30h

Semester – 1 Module Name: Mechanical Workshop Module Code: CP36106P		
Sl. No.	Module Details	Practical Hours 20
1	Usage of Steel Rule, Measuring Tape, Vernier Caliper, Micrometer, Bevel Protractor and Height Gauge	3h
2	Usage of Hand Tools - Files, Spanner etc.	3h
3	Usage of Gauges - Go and No Go, Radius and Feeler Gauges	3h

4	Filing Practice	8h
5	Drilling Practice	3h
	Total Hours	20h

Semester – 1		Module Name: Electrical and Electronics Lab	Module Code: CP36107P
Sl. No.	Module Details	Practical Hours 20	
1	Electrical Safety	1h	
2	Identification and use of Electrical tools	1h	
3	Familiarization of Digital Multimeter (DMM)	1h	
4	Familiarization of Power supply, CRO and FG	1h	
5	Electronics Components Identification and testing- Resistor, Capacitor and Inductor	2h	
6	Understanding of Ohm's law, Kirchhoff's law	2h	
7	Transformers – Familiarization, Polarity test	2h	
8	Testing of- Earth Resistance, MCB, Relay	1h	
9	Familiarization Wires (Power cable/Logic cable)	1h	
10	Practice on Crimping	2h	
11	Practice on Wire Harnessing	2h	
12	Soldering Practice	4h	
	Total Hours	20h	

Semester – 1		Module Name: Computer Lab – CAD	Module Code: CP36108P
Sl. No.	Module Details	Practical Hours 20	
1	Practice on Engineering Drawing	10h	
2	Exercise on CAD Software	10h	
	Total Hours	20h	

Semester – 1		Module Name: OJT	Module Code: CP36109P
Sl. No.	Module Details	Practical Hours 360	
1	On the Job Training in the relevant sector	360h	
	Total Hours	360h	

Semester – 1		Module Name: Employability Skills	Module Code: CP36110T
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	30h

Semester – 2 Module Name: Modern Shop Floor Practices Module Code: CP36201T		
Sl. No.	Module Details	Theory Hours 30
1	5S	6h
2	Gemba	4h
3	Kaizen	5h
4	Poka Yoke	3h
5	Just In Time	3h
6	Standards	4h
7	Muda, Mura and Muri	5h
	Total Hours	30h

Semester – 2 Module Name: Analog Electronics Module Code: CP36202T		
Sl. No.	Module Details	Theory Hours 60
1	Introduction to Semiconductor devices	8h
2	Diode Characteristics	8h
3	Diode Circuits	6h
4	Diode Applications	10h
5	Transistor	8h
6	Transistor Application	12h
7	Regulated Power supply	8h
	Total Hours	60h

Semester – 2	Module Name: Digital Electronics	Module Code: CP36203T
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Sl. No.	Module Details	Theory Hours 45
1	Introduction to digital electronics	3h
2	Number systems and codes	4h
3	Logic gates and Boolean Algebra	8h
4	Combinational logic circuits	9h
5	Latches and flip-flops	8h
6	Sequential Logic Circuits	10h
7	Types of memory	3h
	Total Hours	45h

Semester – 2 Module Name: Metrology Module Code: CP36204T		
Sl. No.	Module Details	Theory Hours 30
1	Introduction	3h
2	Linear Measurements	6h
3	Angular Measurements	4h
4	Dial Indicators	2h
5	Gauges	5h
6	Slip Gauges	2h
7	Introduction to Limits and Fits	8h
	Total Hours	30h

Semester – 2 Module Name: Basics of Computers Module Code: CP36205T		
Sl. No.	Module Details	Theory Hours 15
1	Computer and its peripherals	3h
2	Basics of MS Word	3h
3	Basics of MS PowerPoint	3h
4	Basics of MS Excel	3h
5	Internet	3h
	Total Hours	15h

Semester – 2	Module Name: Analog Electronics Lab	Module Code: CP36206P
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Sl. No.	Module Details	Practical Hours 20
1	VI characteristics of diode	1h
2	Half wave rectifier with and without filter	2h
3	Full wave rectifier with and without filter	3h
4	Clipper and Clamper circuits	3h
5	VI characteristics of Zener diode	2h
6	Transistor characteristics (CE configuration)	4h
7	Transistor Applications as a Switch, Inverter (NOT Gate)	3h
8	Power Electronics Components Identification and testing - BJT, MOSFET, IGBT, SCR	2h
	Total Hours	20h

Semester – 2 Module Name: Digital Electronics Lab Module Code: CP36207P		
Sl. No.	Module Details	Practical Hours 20
1	Familiarization of Logic Gates	4h
2	Universal Property of NAND, NOR gates	4h
3	Boolean Algebra	3h
4	Multiplexer	3h
5	Demultiplexer	3h
6	Half adder and Full adder	3h
	Total Hours	20h

Semester – 2 Module Name: Basics of Computers Lab Module Code: CP36208P		
Sl. No.	Module Details	Practical Hours 20
1	Practice on MS Office - Word, Power Point, Excel	15h
2	Internet and E-mail	5h
	Total Hours	20h

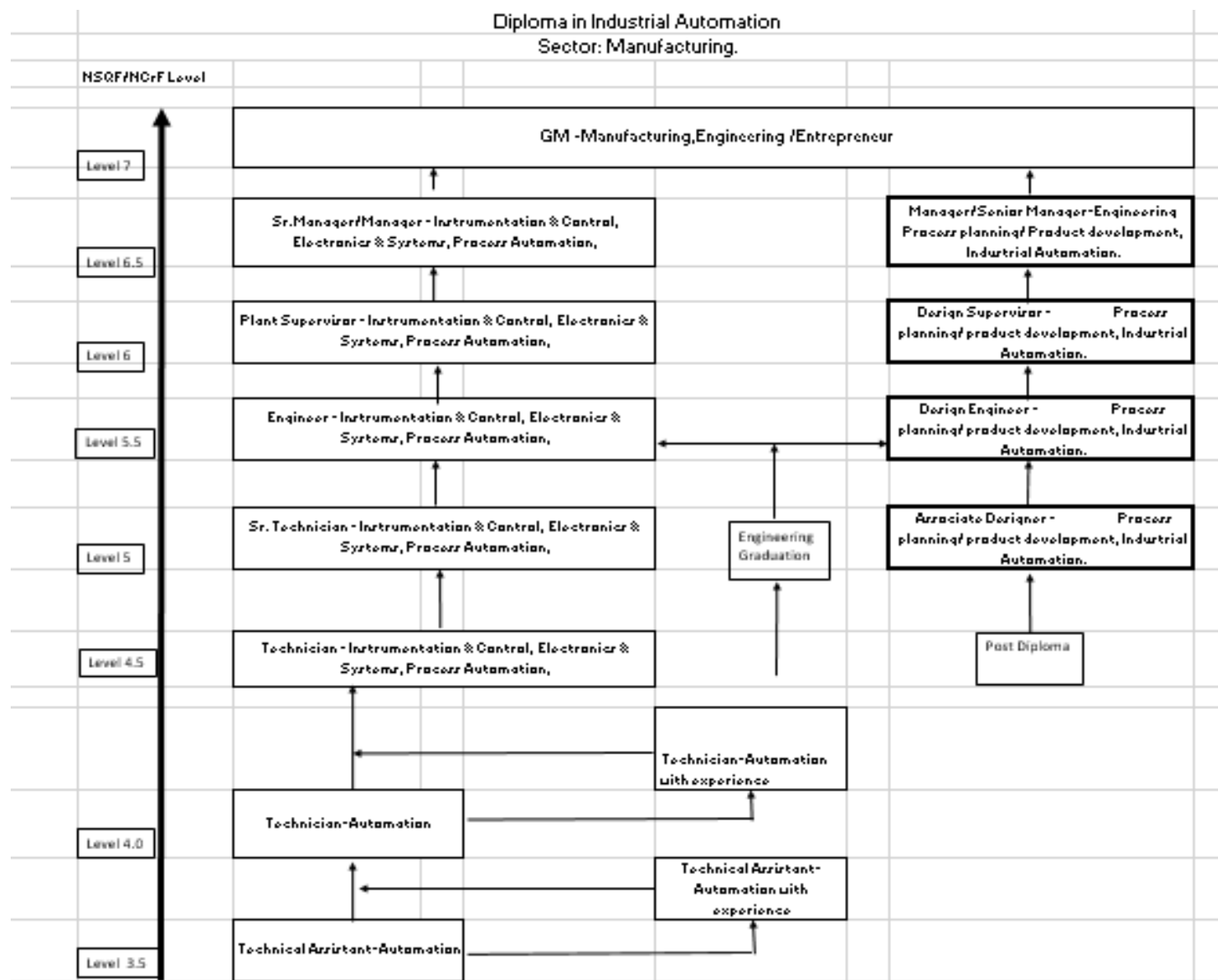
Semester – 2 Module Name: OJT Module Code: CP36209P		
Sl. No.	Module Details	Practical Hours 360
1	On the Job Training in the relevant sector	360h
	Total Hours	360h

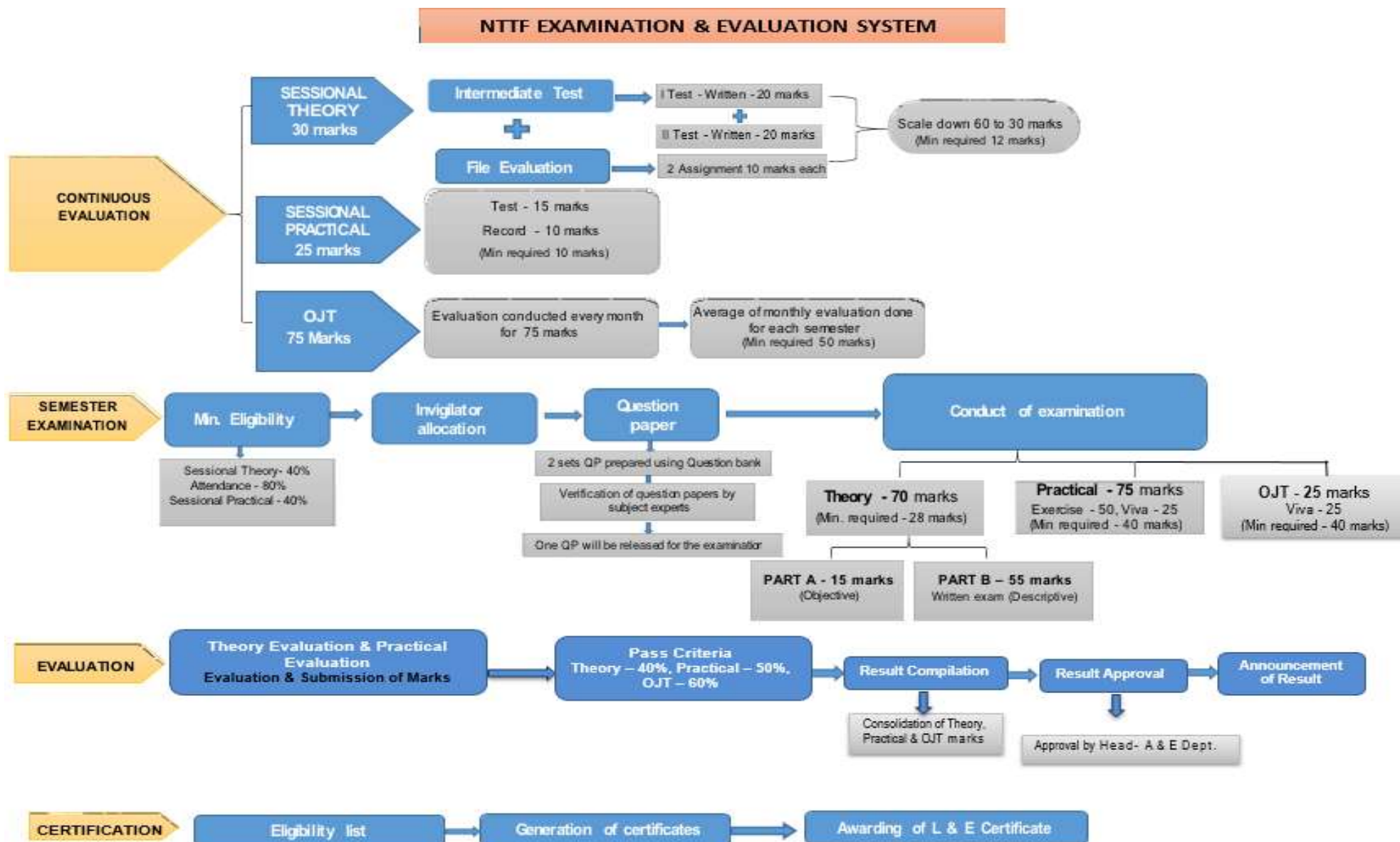
Semester - 2	Module Name: Employability Skills	Module Code: CP36210T
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Sl. No.	Module Details	Theory Hours 45
1	Becoming a Professional in 21st Century	12h
2	English skills	12h
3	Communication skills	21h
	Total Hours	45h

Annexure 9: Career Progression

Job Roles Progression Path



Annexure 10: Assessment SOP

Annexure 11: Occupational Map**Occupational Map - Sector Name: Manufacturing**

As per NCrf		As per NCO-2015	Sub-Sector 1/Automotive, Aerospace, Home appliances, Textile, Construction machinery	
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/Process control and instrumentation, maintenance.	Occupation 2/ Industrial Automation planning and implementation. Product design and development.
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	GM - Manufacturing	GM - Engineering/ Entrepreneur
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	1321,2144, 2152, 3114, 7412	Manager/ Sr. Manager - Instrumentation & Control, Electronics & Systems, Process Automation, Industrial Automation Engineering, Industrial Maintenance Engineering, Consumer Electronics.	Manager/Senior Manager-Engineering Process planning/ Product development, Industrial Automation.

	complex problems 5. Responsibility: Vertical/ Business unit management –Manager or Senior Manager			
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 – Assistant technical supervisor, technical supervisor or Assistant / deputy manager	2152, 3114, 7412,2144	Plant Supervisor - Instrumentation & Control, Electronics & Systems, Process Automation, Industrial Automation Engineering, Industrial Maintenance Engineering, Consumer Electronics.	Design Supervisor - Process planning/ Product development, Industrial Automation.
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, 7412,2144,2141	Engineer - Instrumentation & Control, Electronics & Systems, Process Automation, Industrial Automation Engineering, Industrial Maintenance Engineering, Consumer Electronics.	Design Engineer - Process planning/ Product development , Industrial Automation.
Level 5		2152, 3114, 7412,	Senior Technician - Instrumentation & Control, Electronics & Systems, Process Automation, Industrial Automation Engineering, Industrial Maintenance Engineering, Consumer Electronics.	Associate Designer - Process planning/ product development, Industrial Automation.
Level 4.5	1. Professional Theoretical Knowledge: Range of knowledge 2. Professional and	2152, 3114, 7412,8212	Technician - Instrumentation & Control, Electronics & Systems, Process Automation,	Study Post Diploma

	Technical Skills/ Expertise: Range of technical skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Team readiness & Entrepreneurial readiness-with guidance. 4. Broad Learning Outcomes: Carry out Range of tasks with minimum supervision 5. Responsibility: Accountable/ responsible - Technician		Industrial Automation Engineering, Industrial Maintenance Engineering, Consumer Electronics.	
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-Follow instructions 4. Broad Learning Outcomes: Carry out Range of tasks with supervision 5. Responsibility: Accountable/ responsible - technician/Assistant	7311	Assistant Technician - Automation	
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-Follow instructions 4. Broad Learning Outcomes: Carry out Range of tasks with supervision. 5. Responsibility: Accountable/ responsible - technician/Assistant	3114	Technical Assistant-Automation	

Annexure 12: Key Learning Outcome

SL. NO.	SUBJECT NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL & PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
1st Year				
1	English Communication (CP36101T) Ability to communicate effectively	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.
2	Engineering Mathematics (CP36102T) Ability to solve various mathematical problems	Basic Algebra. 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.
3	Manufacturing Technology - I (CP36103T) Perform tasks associated with the job-role specific to the industry.	Describe and Explain the classification, use and selection of hand tools and Power Tools. Drilling machine - Types, Application, Specification Lathe and its Specification Specify milling machine Explain different milling processes Explain Grinding Operations	Follow good housekeeping Practices Identify different hand tools, Identify and select work holding and tool holding devices for Turning Operations Identify and select work holding and tool holding devices for Milling Operations Understanding Cycle time and Setting time	Practice safety practices in work area. Perform marking operation on Jobs Perform drilling, counter boring, counter sinking, Reaming and Tapping Operations Turn, Mill, Grind parts as per drawings

4	Electrical and Electronics (CP36104T) Electrical and Electronics Lab (CP36107P) Ability to analyse different AC and DC Circuits, Understanding basic Electronics components	Electrical Safety and Protective Devices Basics of Electricity 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 components (Resistors, Inductors, Capacitors).	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.
5	Engineering Drawing (CP36105T) Computer Lab – CAD (CP36108P) Draw, read and comprehend Engineering Drawings.	Knowledge on different drafting materials. Knowledge on geometric constructions, different projections, and dimensioning. Introduction to Geometrical Tolerances	Isometric views and Orthographic projection Dimensioning techniques. Reading Electrical and Electronics Circuits	Draw, read and comprehend various Engineering drawings in the job role. Create and convert different projections. Indicating Surface roughness symbols in Drawing Ability to create simple Engineering drawings through CAD software Application
6	Mechanical Workshop (CP36106P) 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. Filing and Drilling process. Use appropriate hand tools and Gauges in the job role.

7	Modern Shop Floor Practices (CP36201T) Practice the modern shop floor 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 shop floor practices like 5S, Kaizen, Poka Yoke, MUDA, MURA and MURI.
8	Analog Electronics (CP36202T) Analog Electronics Lab (CP36206P) 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.
9	Digital Electronics (CP36203T) Digital Electronics Lab (CP36207P) Application of simple logical circuits in the work area.	Understanding on Number systems and code conversions. Understanding on Logical gates and its operations. Knowledge on types of Memory.	Universal properties of NAND and NOR gates. Reducing logical equations using Boolean algebra and other techniques. Working of combinational and sequential circuits, Latches and Flip-Flops. Sequential Logic Circuits	Application of logical gates, combinational and sequential logics, latches, memories, Adders, Mux and De-mux for control of small processes in industry.
10	Metrology (CP36204T) Ability to apply the appropriate measuring instruments and gauges to measure different objects.	Explain the Importance of Metrology in Industry Select right type of measurement for Linear measurement Select right type of measurement for angular measurement	Perform precision Linear measurements, Angular measurements, Bore measurements Use gauges for measuring internal and external dimension, taper, thread, thread pitch, radius, clearance and profiles	Select and use appropriate Linear and Angular measuring instruments Use different types of gauges Use dial Indicators in workshop/inspection activities

		Explain types of Dial Indicators Classify gauges according to type, purpose and design Explain grades of slip gauges Explain Limits, Fits and Tolerances as per BIS	Define Clearance, Interference and Transition as per BIS Select fits for defined purposes	Use Sine bar for accurate angular measurement Measuring/Inspection Equipment used in Industry
11	Basics of Computers (CP36205T) Basics of Computers Lab (CP36208P) Identify the parts of a computer. Ability to work with MS Office	Identify parts of a computer and peripherals.	Open and work with Microsoft office applications.	Identify and report on different computer parts and peripherals. Perform Microsoft office applications, conversant with use of Internet
12	OJT (CP36109P) OJT (CP36209P)			On the Job Training in the relevant sector
13	Employability Skills (CP36110T) (CP36210T) 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 work place 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