QUALIFICATION FILE

Assistant Tool Maker

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

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

NCrF / NSQF Level: 4.0

Submitted By:

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

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Section 1: Basic Details

<table>
<tr><td>1.</td><td>Qualification Name</td><td colspan="3">Assistant Tool Maker</td></tr>
<tr><td>2.</td><td>Sector/s</td><td colspan="3">Capital Goods and Manufacturing</td></tr>
<tr><td>3.</td><td>Type of Qualification: ☑ New ☐ Revised
☐ Has Electives/Options ☐ OEM</td><td>NQR Code & version of existing/previous qualification:
(change to previous, once approved)</td><td colspan="2">Qualification Name of existing/<s>previous</s> version:
Assistant Tool Maker</td></tr>
<tr><td>4.</td><td>a. OEM Name
b. Qualification Name (Wherever applicable)</td><td colspan="3">NA</td></tr>
<tr><td>5.</td><td>National Qualification Register (NQR) Code &Version
(Will be issued after NSQC approval)</td><td colspan="2">QG-04-CG-01030-2023-V1-NTTF</td><td>6. NCrF/NSQF Level: 4.0</td></tr>
<tr><td>7.</td><td>Award (Certificate/Diploma/Advance Diploma/ Any Other (Wherever applicable specify multiple entry/exits & provide details in annexure)</td><td colspan="3">Advance Certificate</td></tr>
<tr><td>8.</td><td>Brief Description of the Qualification</td><td colspan="3">The Candidate will be able to work on conventional, non-conventional, special purpose machines. Design and manufacture of simple press tools, jigs and fixtures. Generate CAM programs.

The subjects covered in this programme are - Press Tool Technology, Mould technology, CAD/CAM, CNC Technology, Production technology, Metrology, Jigs and Fixtures, Material Technology and Heat Treatment, Strength of Materials, Tool design drawing, Work shop practice, Employability skills.</td></tr>
<tr><td>9.</td><td>Eligibility Criteria for Entry for Student/Trainee/Learner/Employee</td><td colspan="3">a. Entry Qualification & Relevant Experience:
<table>
<tr><th>Sl. No.</th><th>Academic/Skill Qualification
(With Specialization - if applicable)</th><th>Required Experience (with Specialization)</th></tr>
<tr><td>1</td><td>Certificate- Mechanical Fitter (Level 3.5) from NTTF.</td><td>NA</td></tr>
</table></td></tr>
</table>

		2	Lateral Entry to Second Year: a) 12th Pass with Mathematics OR b) After 10th Pass 2 years ITI Candidates of the following trades: Fitter, Turner, Machinist Grinder, Machinist, Mechanic Machine Tool Maintenance, Tool & Die Maker (Dies & Moulds), Tool & Die Maker (Press Tools, Jigs &Fixtures) OR c) After 10th Pass completed 2 years diploma in relevant trade		

10.	**Credits Assigned to this Qualification, Subject to Assessment** *(as per National Credit Framework (NCrF))*	**Total Credits – 40**	**11. Common Cost Norm Category (I/II/III)** *(Wherever applicable)***:** **NA**
12.	**Any Licensing requirements for Undertaking Training on This Qualification** *(wherever applicable)*	**NA**	

13. **Training Duration by Modes of Training Delivery**
*(Specify **Total Duration** as per selected training delivery modes and as per requirement of the qualification)*

☐ **Offline** ☐ **Online** ☑ **Blended**

Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT/Project Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)
Classroom (offline)	315	620	90	NIL	1025
Online	105	70			175

(Refer Blended Learning Annexure for details)

14.	**Aligned to NCO/ISCO Code/s** *(if no Code is available mention the same)*	NCO Code –2015.7222.0200, 2015.7222.9900,

15.	**Progression path after attaining the qualification** *(Please show Professional and Academic progression)*	**Professional Progression:** After completion, can work as assistant tool maker in metal stamping or plastic mould industry. After Completion of 3 years of Full Time Programme and after 3 years of Industry Experience the Job Holder can work as Tool and Die Engineer, Process Engineer, Product Design Engineer, Tool Designer, Digital Manufacturing engineer, Digital Quality engineer and Additive Manufacturing Engineer. **Academic Progression:** Diploma -Tool Engineering and Digital Manufacturing. Post Diploma, B. VoC and B.Tech Degree Course in Relevant areas.	
16.	**Other Indian languages in which the Qualification & Model Curricula are being submitted**	Hindi	
17.	**Is similar Qualification(s) available on NQR-if yes, justification for this qualification**	**☐ Yes ☑ No URLs of similar Qualifications: NA**	
18.	**Is the Job Role Amenable to Persons with Disability**	**☐ Yes ☑ No If "Yes", specify applicable type of Disability:**	
19.	**How Participation of Women will be Encouraged**	**Yes** - Admission open to women candidates (30% seats reserved)	
20.	**Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)**	**☑Yes ☐ No Employability Skills Module Code: CP01409T**	
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: 29 Sep 2023**	**24. Validity Duration: 3 years**	**25. Next Review Date: 29 Sep 2026**

Section 2: Module Summary

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

Mandatory Module/ NOS/s: Specify the training duration and assessment criteria at NOS/ Module level. For further details refer to the 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 – 3																
1	Production Technology – 3	CP01306T	Core	4.0	20	40	-	-	-	40	100	-	-	-	100	
2	Metrology -3	CP01307T	Core	4.0		20	-	-	-	20	100	-	-	-	100	
3	Material technology and Heat Treatment	CP01308T	Core	4.0		40	-	-	-	40	100	-	-	-	100	
4	Press Tool Technology 1	CP01310T	Core	4.0		40	-	-	-	40	100	-	-	-	100	
5	Jigs and Fixtures	CP01311T	Core	4.0		40	-	-	-	40	100	-	-	-	100	
6	Strength of materials 1	CP01312T	Core	4.0		20	-	-	-	20	100	-	-	-	100	
7	CAD Fusion 360 Lab	CP01305P	Core	4.0		-	60	-	-	60	-	80	-	20	100	
8	Tool Design Drawing-1	CP01313P	Core	4.0		-	60	-	-	60	-	80	-	20	100	
9	Workshop Practical	CP01322P	Core	4.0		-	250	-	-	250	-	80	-	20	100	
10	Employability Skill	CP01323T	Core	4.0		30	-	-	-	30	75	-	-	25	100	
Duration (in Hours)/ Total Marks					**20**	**230**	**370**	**-**	**-**	**600**	**675**	**240**	**-**	**85**	**1000**	
Semester – 4																
11	Mould Technology - 1	CP01401T	Core	4.0	20	40	-	-	-	40	100	-	-	-	100	
12	Production Technology -4	CP01402T	Core	4.0		20	-	-	-	20	100	-	-	-	100	
13	Strength of Material -2	CP01403T	Core	4.0		20	-	-	-	20	100	-	-	-	100	
14	Press Tool Technology -2	CP01404T	Core	4.0		40	-	-	-	40	100	-	-	-	100	
15	CNC Technology	CP01405T	Core	4.0		40	-	-	-	40	100	-	-	-	100	

16	Tool Design Drawing -2	CP01406P	Core	4.0		-	60	-	-	60	-	80	-	20	100	
17	Workshop Practical	CP01407P	Core	4.0		-	200	-	-	200	-	80	-	20	100	
18	CAD/CAM -1	CP01408P	Core	4.0		-	60	-	-	60	-	80	-	20	100	
19	Employability Skill	CP01409T	Core	4.0		30	-	-	-	30	75	-	-	25	100	
20	OJT	CP01410P	Core	4.0				90		90		75		25	100	
Duration (in Hours)/ Total Marks					**20**	**190**	**320**	**90**	**-**	**600**	**575**	**315**	**-**	**110**	**1000**	
Total for 1-year Programme					**40**	**420**	**690**	**90**	**-**	**1200**	**1300**	**555**	**-**	**195**	**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)*

Minimum 40% in each Theory module, 50% in each Practical module and 60% in Project.

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*	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 Manufacturing, Capital Goods and Automotive Industries. a. MSDE Annual Report 2021- 2022 predict very high growth on automobile and capital goods sector 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, Auomotive Components Manufacture Sector c. Human Resources and Skill Requirements in the Capital Goods Sector report (2012 – 2017 2017 – 2022) The Report Envisages Higher Growth in Capital Goods Sector –Electronic Components, Electrical Components, and Auto Components etc. The above two will lead to Higher requirement in Press tool, Moulds and Jigs and Fixtures This calls for qualified Tool makers in large numbers in the Future. d. 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 Tool Engineering and Digital manufacturing
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. 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. The Study has found Digital Manufacturing Engineer, Tool Room Technician, 3D Printing Technician has new job roles emerging in the Manufacturing Sector.
4.	**Number of Industry validation provided:** 47
5.	**Estimated nos. of persons to be trained and employed: 1200/ 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) (Annexure 8)
11.	**Supporting Document:** Career Progression *(Mandatory – Public view)*	Yes (Annexure 9)
12.	**Supporting Document:** Occupational Map *(Mandatory)*	Yes (Annexure 11)
13.	**Supporting Document:** Assessment SOP *(Mandatory)*	Yes (Annexure 10)
14.	**Supporting Document:** Key Learning Outcome	Yes (Annexure 12)
15.	**Any other document you wish to submit:**	No

Annexure 1: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	• Explain the operations of various Conventional, Non-conventional and Special purpose machines. • Explain the prescribed method for measuring various profiles and dimensions using appropriate devices. • Explain the tool steels used and their heat treatment. • Explain various types of Jigs and Fixtures, Press tools, their parts, functions. • Design considerations of various types of Jigs and Fixtures, Press tools. • Explain the types of Polymers and different Moulding processes. • Demonstrate Manufacturing methods of press tools, Jigs and fixtures. • Programming and operating and basic Maintenance of CNC machines. • Describe entrepreneurship skills, financial and legal aspects, occupational safety.	• Application of the knowledge and skills gained from learning Conventional, Non-conventional and Special purpose machines in a wide range of industries. • Application of technical and professional skills that are essential in quality control to perform accurate and repeatable measurements. • Provide Specification and Application of suitable Materials and their Heat Treatment. • Design and manufacture of simple press tools and Jigs and Fixtures using CAD and CNC machines. • Generate CAM programs using CAM. Execution of Programs on CNC Milling and Lathe Machines. • Application of polymers used in moulding. • Demonstrate financial management ideas, taxations and benefits and legal compliance in the workplace. Follow all safety norms laid by the industry to develop a safe workplace.	**4.0**
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Perform machining operations using various Conventional, Non-conventional and Special purpose machines and check quality. • Design various types of simple Jigs and Fixtures, Press tools. • Manufacturing of various types of simple Jigs and Fixtures, Press tools. • Perform machining operations using CNC milling and turning. • Prepare CNC programming and tool selection. • Explain Injection Moulding process, and polymers. • Describe types of Moulds. • Perform assembly of Jigs and fixtures, Press tools.	• Machining of tool elements using conventional milling, turning, grinding machines and Wire, Spark EDM machines. • Inspection of tool elements for dimensional, profile and tolerances. • Design simple Jigs and fixtures, Press tools, prepare detail manufacturing drawings using CAD software. • Process planning and manufacturing of tool elements. • Prepare and execute CNC programming using CAM software. Operate CNC machines to machine tool elements. • Demonstrate polymers used in Moulding. • Demonstrate type of injection moulds.	**4.0**

	• Describe personal finance management, investments, returns, basics of taxes.	• Fitting and assembly of element of simple Jigs and fixtures, Press tools. • Demonstrate various financial management ideas, taxations and benefits and legal compliance in the workplace.	
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Communicate Effectively with Peers and Supervisors in the work area. • Describe Knowledge on Organization, ethical & moral values, and Practice Time Management • Proficiency in Manual metal working Processes • Proficiency in Designing Press Tools, Jigs and Fixtures • Proficiency in Software CAD and CAM • Proficiency in using Conventional Machine, Nonconventional Machine and CNC Machine • Proficiency in Use of Measuring/Inspection Equipment	• Demonstrate good Communication with Peers, superiors both verbal and written, good on Presentation Skills, QC, and 5S. • Perform Manual metal working Operations. • Machine Components using Conventional and CNC Machines • Programming in CAD/CAM for CNC machine and Nonconventional machine • Application of Measuring/Inspection Equipment • Design, Process Plan, Manufacture and Assemble Try out of simple Jigs and Fixture, Press Tool	**4.0**
Broad Learning Outcomes/Core Skill	• Proficiency in Design of Jigs and fixture, Press tools, using CAD software. • Proficiency in manufacturing and inspection of tool elements using conventional, non-conventional and CNC machines. • Assemble Jigs and fixtures, Press tools. • Prepare Technical Reports and Presentations using MS Office. • Describe Safety and standard operating Procedures and Practices in the work area. • Communicate with Peers and Superiors. • Describe effective 5S.	• Design, prepare technical drawings using CAD, and manufacture, using conventional, non-conventional and CNC machines. • Inspect and assemble of tool elements for Jigs and fixtures, Press Tools. • Prepare technical reports and Presentation using MS Office. • Follow all safety norms and standard operating Procedures in the work area. • Demonstrate verbal and written communication, Maintain Good Relationship with Peers and Superiors.	**4.0**
Responsibility	• Be Aware of Personal/Industrial goals. • Adapt to changes in the work area. • Describe safety Procedures and SOPs in the relevant work area.	• Carry out Design and Manufacture of simple Jigs and Fixture, Press Tool. • Guide fitters in Fulfilling Tasks Assigned to them.	**4.0**

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

Tools and Equipment requirement for a batch of 30 Trainees

Metrology Lab – 2nd Year		
Sl. No.	**Name of the Tool and Equipment**	**Quantity**
1	Profile Projector - Ø300 Screen with 50X Magnification (Dyna Scan)	1
2	Hardness Tester	1
3	CMM with Accessories	1
4	Bore gauge Set – 6 - 10, 10 - 18.5, 18 – 35	1
5	Dial Indicator Plunger type, 0.01, range 0 – 10 mm	1
6	Digital Dial Indicator Plunger type, 0.001, range 0 – 8 mm	1
7	Dial Indicator Lever type, 0.01, range 0 – 0.8 mm	1
8	Slip Gauge 87 pieces (Inspection grade)	1
9	Magnetic Stand	2

Machines – 2nd Year			
Sl. No.	**Machine**	**Recommended Specification**	**Quantity**
1	Centre Lathe	Machining Dia: 100mm x 650mm long	1
2	Vertical Milling Machine	Machining size: 250mm x 150mm x 100mm H	1
3	Universal Milling Machine	Machining size: 250mm x 150mm x 100mm H	1
4	Tool Milling Machine with DRO	Machining size: 250mm x 150mm x 100mm H	1
5	Surface Grinding Machine	Machining size: 450mm x 150mm x 100mm H	1
6	Cylindrical Grinding Machine	Machining Dia: 60mm x 250mm long	1
7	CNC Lathe with servo stabilizer	Machining Dia: 60mm x 150mm long	1
8	CNC Milling Machine with servo stabilizer	Machining size: 250mm x 150mm x 100mm H	2
9	Pillar Type Drilling Machine	Maximum Dia. On steel – Ø25m	1

10	Fly Press	No. 10	1
11	Bench Grinder	Wheel Dia: 200mm x 20mm thick - 2 sided	1
12	Tool and Cutter Grinder	Dia, 120 and Length 200	1
13	Compressor	Reciprocating Air Compressor - 2 stage/2 Cylinder with 5HP, 3.7kW, Air delivery 440 l/min., Tank capacity – 220 l.	1

Computer lab		
Sl. No.	**Equipment**	**Quantity**
1	Server	1
2	Switch and Cabling	1
3	Computers with networking and Furniture	15
4	UPS	1

Software		
Sl. No.	**Software Name**	**Quantity**
1	Autodesk Fusion 360 Open-Source Education License	
2	Master CAM	5
3	CNC training /simulation software (10 user license)	1

Note:

- The Tools, Equipment, Software, and other lab facilities are shared between Qualifications and batches.
- During admission the trainees are supplied with a toolkit containing Micrometer 0- 25mm L.C. 0.01mm, Vernier Caliper 0- 150mm L.C. 0.02mm.
- Trainees are provided with Laptop.

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. White board
2. Projector with screen / Smart TV
3. Laptop / computer

Annexure 3: Industry Validations Summary

Provide 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	Mogora Cosmic (P) Ltd	Sanjay Hubli		El 31/16, Electronic Zone, Bhosari, Pune, Maharashtra – 411026	9820907828	hubli@mogora.com	
2	PMT Machines Pvt Ltd	Sonali K. Weljali		Behind PCMC, Mumbai-Pune Highway, Pimpri, Pune	7219012966	ssd@pmtmachines.com	
3	Renata Precision Components Pvt.Ltd.	Rohit Thawani		J-526, MIDC, Bhosari, Pune – 411026, India	7774086210	rohit.thawani@renata.co.in	
4	Sridevi Tool Engineers Pvt. Ltd.	Divyesh HR Department		62-D, M.G. Road, Opp. Raychem Industries, Valiv - Village, Vasai - East, Palghar - 401 208, Maharashtra, India.	8828124118 09987924808	rfq@sridevitools.com	
5	KHK Scoffolding Ltd	Prashanth Kumar Putchala		P O Box 28480, Ducast Factory Building, Al Quoz Industrial Area 2, Dubai UAE	971-4-3411106 Ext: 107 971-58 2263788	khkscaf@emirates.net.ae	
6	Yanfeng India Automotive Interior Systems Pvt. Ltd.	Subodh Deshmukh		Plot No. G-1, Chakan MIDC Phase -III, Village: Nighoje Taluka Khed, Dist: Pune, Maharashtra– 410501	9822721116	yfi.info@yfai.com	https://www.linkedin.com/company/yanfeng-global/
7	Bharat Automotive Pressings Ind Pvt Ltd	Shabbir		W-148/149, 'S' Block, MIDC, Bhosari, Pune - 411 026. India	7620267852		dsmahajan@bapipl.com
8	Larsen & Toubro Limited	Chaitanya		Ahmedabad. 501, Sakar Complex I, Ashram Road Ahmedabad Pin - 380 009. Tel: 079-4900 4000. Fax: 079-2658 0491.	9623122445	Nehal.Shah@Larsentoubro.Com	
9	Shaily Engineering Plastics Ltd	Shagun Rai		Survey No.363 & 364 & 366, Rania, Ta. -Savli, Baroda, Gujarat, India- 391 780	9974093907	careers@shaily.com	

10	Heitkamp Und Thumann (S) Pte Ltd	Serene Ang		27 Senoko South Road Woodlands East Industrial Estate, Singapore 758082	65-6871-4406 65-9631-7795	info@ht-group.com	
11	Amritha Tools Craft	Sridhar Reddy		203/9, Phase Ii, IDA, Cherlapally, Hyderabad, Telangana 500051	9963976174	ksrinivas@amrithatoolcrafts.com	
12	Siemens Ltd	Sadiq Anwer		Aurangabad	02403985227 09689969996	sapatc.in@siemens.com	
13	Kirloskar Brothers Ltd	Mr.Ramesh Bijapur		Wadi	7447472727	hr@kbl.co.in	
14	Cears Dies & Moulds Pvt. Ltd.	Harikesh		Cears Dies & Moulds Pvt Ltd. F14, Satpur MIDC, Nasik (Maharashtra) India 422007	91-253-6614-554 Mob:9011093644	ajay@cears.co.in	
15	Molex (India) Pvt. Ltd	Pallavi Ranganath		6a, Sadaramangala Industrial Area, Kadugodi, Bengaluru, Karnataka, 560067	080 - 41293503	pallavi.ranganath@molex.com	
16	Achintyo Engineering Llp	Manjunath Kalburgi		#2331/B, 1st Floor, Rohan Plaza, 17 Th Cross, HSR Layout-1st Sector, Bengaluru,560102	(0)80 2258 2821	mail@achintyo.com	https://www.linkedin.com/company/achintyo/
17	Whirlpool Of India Ltd	Mahendra D Jadhav		Plot#A4, Ranjangoan, MIDC, Maharashtra 412220	9028031731		https://www.linkedin.com/company/whirlpool-of-i-limited/
18	Siemens Ltd	Parag Shewale		Verna Industrial Estate, Verna, Goa 403722	9601275119		https://www.linkedin.com/in/paragshewale/
19	ARaymond Fastners India Pvt. Ltd	Sujay Jadhav		A Raymond Fasteners India Pvt. Ltd Address: Gat No. 259, 276/8b, Nighoje-Chakan, Taluka-Khed, Pune- 410501	9922991974 (SJ) Tel : +91 (2135) 676 214	sujay@araymond.com	https://www.linkedin.com/company/a-raymond-fasteners-india-private-limited
20	TTB Tooling	Kirit chheda		Plot No 63, Chimbali Phata Road, Chimbali, Khed, Pune, Maharashtra 412105	9930702054	admin@ttbtooling.com	https://www.linkedin.com/in/kirit-chheda-12a77142/
21	Bector Automation Rml India Pvt. Ltd.	Amol Chougule		Plot No 24, Gat No 613-1, Talkhed, Kurala	7506506098	careers@rmlnz.com	https://www.linkedin.com/company/bector-

				Maharashtra 410501			automation-rml-india-private-limited/
22	Aisin Automotive Karnataka Pvt Ltd	Vijay S		Achatnahalli, Karnataka 563103	9900087705	iranna.n@aisin-akl.co.in	https://www.linkedin.com/company/aisin-automotive-karnataka-private-limited/
23	Galva Deco Parts Pvt Ltd	Bal Krishna Shrivas		MIDC Sector 7, Industrial Area, No153 Plot Pcntda, MIDC Rd, Bhosari, Pimpri-Chinchwad, Maharashtra 411026	9168007336		
24	Dhoot Transmission Pvt Ltd	Vinayak		Gat No 312, Nanekarwadi, Chakan Maharashtra 410501	9022478398	corporatehr1@dhoottransmission.com	https://www.linkedin.com/company/dhoot-transmission-p-ltd/
25	SMP Engineers & Electricals Pvt. Ltd.	Swati Gangurde		Nandni Nagar, MIDC, Ambad, Nasik, Maharashtra 422010	7030917846	swati.gangurde@divineindia.co.in	https://www.linkedin.com/company/smp-engineers-and-electricals-private-limited/
26	Minda Industries Ltd	Tushar Verma		B6, MIDC, Chakkan Industrial Area, Talegon-Chakan Road, Mahalunge, Ingale, Maharashtra 410501	0124-2290427		
27	Vasantha Tool Crafts Pvt Ltd	K. Sunil kumar		7-24/2, Pipeline Road, Subhash Nagar, Jeedimetla, Hyderabad, Telangana 500055	9959971307	Sunilkumar@vasantha.com	https://www.linkedin.com/in/sunil-kumar-talari-328b59a8/
28	Amphenol Interconnect India Pvt. Ltd	Divakar Kulkarni		105, Bhosari Industrial Area, Landewadi, Bhosari, Pune 411026	020 67360304	vbhavsar@amphenol-in.com	https://www.linkedin.com/company/amphenol-interconnect-india-private-limited
29	KSPG Automotive India Private Limited	Shrikant Bongale		Takawe B K, Maharashtra 412106	9552667100		https://www.linkedin.com/in/shrikant-bongale-43644898/
30	Amod Industries	Mahendra Deshmukh		L-215/1, Nimblak Road, MIDC, Ahmednagar,	8390900870	Amod.industries@gmail.com	https://www.linkedin.com/company/amod-

				Maharashtra 414111			group-of-industries/
31	Samvardhana Motherson Reydel Companies	Dinesh Pawale		283-2, Phase 1, Hinjewadi, Rajiv Gandi Inoteck Park, Hinjewadi, Pune 411057	020 66534720	dineshp@smrc-automotive.com	https://www.linkedin.com/company/samvardhana-motherson-reydel-companies/
32	SKH Sheet Metals Components Pvt. Ltd	Mani Awasthi		Gatno.542/545, Behind Bombay Dyeing, Ranjangaon, Maharashtra 412220	9607034533	skhsmc@skhgroup.co.in	https://www.linkedin.com/company/skh-sheet-metal-componant
33	Devu Tools.Pvt.Ltd	Praveena		Sakinaka, Mumbai 400072	9820556950		
34	Goa Sintered Products Pvt Ltd	Anil Lotlikar		Mugali, St Joes De Areal, Salcet, Goa	098229 80402	accounts@goasintered.com	https://www.linkedin.com/in/rahul-lotlikar-92b92323/
35	Satyam Venture Engg Services Pvt Ltd	Pavan Kumar Kaja		1-8-301-306, Ashoka My Home Chamber, S P ROAD, Sindhi Colony, Begumpet, Secunderabad, 500030	9985328222	pavankumar_kaja@satven.com	https://www.linkedin.com/company/satyam-venture-engineering-services/
36	Easi Technologies Pvt Ltd	Sridhar S		Salarpuria Areana,24, 6th, Hosur Rd, Bengaluru 560030	98455063106	sridhars@allegisindia.com	https://www.linkedin.com/company/easi_2/
37	Mahindra Cie Automotive Ltd - Bill Forge Division	Reginald Jacob		Gat 856-860, Chakan-Ambethan Rd, Khed Taluka, 410501	91-80-27826991-97		
38	Magna Automotive India Pvt. Ltd	Suyog Chhatre		Chakan, Maharashtra 410501	9145286093		
39	Nypun tooling and press components private limited	Sethumadhavan G Nair		194, Sector 10 Sector 17/19, MIDC, Bhosari, Pimpri Chinchwad, Maharashtra 411026		sethumadhavannr90@gmail.com	
40	Varroc Engineering Ltd	Mr Jaydip		R6P2, HCF, MIDC, Waluj, Aurangabad, Maharashtra 431133	9717288691		
41	Gestamp Automotive India	Shweta Karekar		Gate 374, 517-521 & 523, Takawe Bk, Maharashtra 412106	9673330972	krathod@in.gestamp.com	https://www.linkedin.com/company/gestamp/
42	All Time Plastics Private Limited	Girish C.V.		B-30, Royal Industrial, Estate, Rd No 26, Wadala,	7573025459		

				Mumbai, Maharashtra 400031			
43	Dyna K Automotive Stampings Pvt Ltd	Ravindra Jadhav		J6 MIDC, Indrayani Nagar Rd, Balaji Nagar, Pimpri Chinchwad, Maharashtra 411026	8888833976	contact@dynakstamp.com	https://www.linkedin.com/company/dyna-k-automotive-stampings/
44	PSR Tooling	RAJESH		10/01/0386, Bhosari Telco Rd, MIDC, Bhosari, Pimpri Chinchwad, Maharashtra 411026	9026478368	rajesh@psrtaspl.com	https://www.linkedin.com/jobs/view/tools-design-engineer-at-psr-toolings-stamping-pvt-ltd-3399742658/
45	Toyota Industries Engine India	Brijendra Shah		Plot No 9, Jigani Industrial Area Phase I, Jigani, Bengaluru 560105	9538997508	tiei@tiei.toyota-industries.com	
46	Yanfeng India Automotive Interior Systems Pvt. Ltd.	Subodh Deshmukh		Plot No. G-1, MIDC, Pimpri Colony, Pimpri Chinchwad, Maharashtra 411018	9822721116	yfi.info@yfai.com	https://www.linkedin.com/company/yanfeng-global/
47	Makino	Sudhakar		No 11, Whitefield Main Road, EPIP Zone, Whitefield, Bengaluru 560066	9972524113	mttcs@makino.com.sg	https://www.linkedin.com/in/mttc-sudhakar-b3291429

Annexure 4: Training & Employment Details

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

Year	Total Candidates		Women		People with Disability	
	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities
2023	1000	More than 10000	300	More than 2000	-	
2024	1200	More than 10000	360	More than 2000	-	
2025	1400	More than 10000	420	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	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
Tool Engineering and Digital Manufacturing	2017- 2020	1046	917	896	896	8	8	8	8	NIL			
	2018 - 2021	863	811	804	804	11	11	11	11				
	2019 - 2022	875	807	799	799	5	5	5	5				

Applicable for revised qualifications only, data to be provided year-wise for past 3 years.

List Schemes in which the previous version of Qualification was implemented:

2nd year of 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

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	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	95:05
3	Showing Practical Demonstrations to the learners	Workshop / Lab, Video recording, Simulators	70:30
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	70:30
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 – 3					
Production Technology - 3	Milling -II – Work holding, tool holding methods, types of cutters, For milling related calculations.	15			
	Grinding-II – Grinding operations, types, specifications and application of wheels, Grinding calculations.	25			
	Broaching – Broaching operation, machines used, process details.	5			
	Jig boring and Jig grinding – Jig boring and Jig grinding operation, machines used, process details.	10			
	Super finishing process – Honing, polishing.	10			
	Electric Discharge machines – Working principle and operation of Wire EDM , Spark EDM.	20			
	Other Manufacturing Processes – Rolling, Drawing, Extrusion, Forging.	15			
	Total Marks	100			
Metrology - 3	Hardness checking – Types of Hardness, Hardness testing machine, Operation.	20			
	Interferometry – Methods and equipment used.	15			
	Form and position features - Methods and equipment used.	25			
	Miscellaneous measurement – Measuring internal & external details, Screw threads, Gear teeth profile.	20			
	Surface texture measurement – Methods and instruments used.	20			
	Total Marks	100			
Material technology and Heat Treatment	Atomic bonds – Types of bonds, effect on properties of metal.	5			
	Crystalline structure – Types of structure, effect on properties of metal.	5			
	Solid solutions, Solid phase and Phase diagram – Interpretation of Iron-Carbon equilibrium diagram.	5			

	Solidification of metals – Stages and crystal formation during solidification.	5			
	Heat Treatment – Annealing, Normalising, Hardening, Tempering.	20			
	Heat Treating equipment – Types of heat treatment furnaces.	10			
	Post Heat Treatment – Double tempering, sub-zero treatment of heat treated parts.	15			
	Metallurgical microscope – Description and use of metallurgical microscope.	5			
	Heat Treatment of different materials – Heat treatment procedure for different types of steel.	10			
	Possible defects and remedies in Heat Treatment – Precautions to be taken during heat treatment process to prevent defects.	10			
	Surface Treatment – Case hardening and surface hardening process.	15			
	Planning for Heat Treatment and Case study	5			
	Total Marks	100			
Press Tool Technology	Introduction to Press Tools – Types of press tools and press tool operations.	5			
	Stock Material – Explanation of stock materials used in press tool operations.	5			
	Theory of Shearing – Stages of shearing.	5			
	Cutting force and Cutting clearance – Determination of cutting force and cutting clearance.	5			
	Basic Design of Guide Plate Tool	5			
	Elements of Guide Plate Tool	5			
	Land and Angular Clearance – Purpose of land and angular clearance.	5			
	Basic design of Progressive Tool	10			
	Strip layouts – Types of strip layout.	10			
	Die blocks – Types of dies, solid and split dies.	5			
	Punches – Types of punches.	5			
	Strippers and Gauges – Function of strippers and gauges in press tool.	5			

	Stoppers – Types of stoppers and its application.	5			
	Pilots – Types of pilots and its application.	5			
	Side cutters – Function of side cutter in progressive tool.	5			
	Ejectors and shedders – Function and Types.	5			
	Fasteners and dowels – Used in press tools.	5			
	Shank – Types of shank, Location of shank.	5			
	Total Marks	100			
Jigs and Fixtures	Jigs and Fixture – an Introduction -	10			
	Planes of movements	5			
	Possible movements of work piece	5			
	Locating of work piece	5			
	Types of jigs	5			
	Types of fixtures	10			
	Fixture and machine relation	5			
	Jig and machine relation	5			
	Element of jig, fixture	15			
	Jig, fixture and cutting tool relation	5			
	Design steps of jigs and fixtures	20			
	Materials and heat treatment of jig, fixture elements	5			
	Failure of jig, fixture	5			
	Total Marks	100			
Strength of materials	Simple stresses and strain – Hook’s law, Poisson’s ratio, Young’s modulus related calculations.	35			
	Direct shear stresses – Terms and related calculations.	20			
	Thermal effect on stress and strain – Calculating the Thermal effect on stress and strain.	20			
	Struts and columns – Explanation and related calculations.	25			
	Total Marks	100			

CAD Fusion 360 Lab - 3	Sketch and Constraints and 3D Modeling		10		
	Assembly modeling of Jigs and Fixtures		10		5
	Create 3D models of the given components		10		
	Draw strip layout of different sheet metal components		10		5
	Press Tool Drafting – Single stage Progressive tools		10		5
	Progressive Press Tool Drafting – 3 Progressive tools		20		5
	Model Test – Time bound task on design		10		
	Total Marks	100			
Tool Design Drawing - 1	Design of fixtures		10		5
	Design of jigs		10		5
	Design of guide plate tool		10		5
	Press tool with die set		20		
	Design of progressive tool		30		5
	Total Marks		100		
Workshop Practical - 3	Precision Fit – Execution of precision fit		15		5
	Manufacturing Progressive Tool elements - Operations: Bench work, Conventional and Non- Conventional Machining, CNC Machining and Inspection		65		15
	Total Marks		100		
Employability Skill	Diversity and Inclusion, Gender sensitivity PwD etc.	15			5
	Career development & Goal setting	20			10
	Entrepreneurship	15			5
	Analytical thinking & Adaptive Thinking	25			5
	Total Marks		100		
Semester – 4					
Mould Technology - 1	Plastic in Moulding Industry – Types of plastics, properties.	5			
	Injection Moulding Machine – Types, specification.	5			
	Basic Terminology of Injection Moulds	5			

	Number of Cavities – Determining number of cavities of mould.	10			
	Parting Surface – Selection of parting surface.	10			
	Feed Systems – Types of feed system, selection criteria.	10			
	Ejection System – Types of ejection systems, application.	10			
	Plastic Shrinkage – Effect, dimensioning core and cavity.	10			
	Temperature controlling for Moulds	10			
	Mould Cycle – Explanation of mould cycle, Importance of mould cycle time.	5			
	Split Cavities – Purpose, method of providing split cavities.	10			
	Side Core and Side Cavity – Purpose, method of providing.	10			
	Total Marks	100			
Production Technology - 4	Basic Health and Safety – In work place.	15			
	Non-conventional machining – EDM, Water jet machining, chemical milling, laser cutting.	25			
	Working Effectively with others at work – As a team	15			
	Machine tool Maintenance – Routine and preventive maintenance.	25			
	Additive manufacturing – Introduction to additive manufacturing.	20			
	Total Marks	100			
Strength of Material - 2	Bending stress – Explanation, Application and related calculations.	40			
	Torsion of shaft - Explanation, Application and related calculations.	30			
	Torsion of springs - Explanation, Application and related calculations.	30			
	Total Marks	100			
Press Tool Technology - 2	Presses – Types, specification, application.	5			
	Die sets - Types, specification, application.	5			
	Different types of press tools	5			
	Compound Tool – Elements and Function.	5			

	Comparison of Progressive and Compound tool	5			
	Bending Tool – Types of bending tools.	15			
	Deep Drawing – Operation, Elements of tool.	15			
	Forming – different operation	5			
	Shaving – Operation, tool, application.	5			
	Fine blanking - Operation, tool, application.	10			
	Unit tooling – Advantages, basics of design.	5			
	Forging - Operation, Forging tool.	5			
	Extrusion – Operations.	5			
	Tooling Material – Selection of materials for tools.	5			
	Tool Handling – Related equipments, their function.	5			
	Total Marks	100			
CNC Technology	Familiarize with the technology of NC/CNC/DNC system	15			
	Classification of CNC machine	10			
	Elements of CNC machine	10			
	Tool and Tool materials used in CNC machine tools	15			
	CNC Milling	20			
	CNC Turning	15			
	Basic CNC Maintenance and Trouble shooting	15			
	Total Marks	100			
Employability Skill	Financial and Legal Literacy	20			10
	Occupation safety, Health, and Environment education.	20			5
	Digital Literacy Skills	15			5
	Essential skills for success.	20			5
	Total Marks	100			
Tool Design Drawing - 2	Design of Fixtures	5	15		
	Design of Jigs	5	15		

	Design of Guide plate tool		15		
	Press tool with die set	5	15		
	Design of Progressive tool	5	25		
	Total Marks		100		
Workshop Practical - 4	Assembly and Trial of Progressive Tool		20		6
	Manufacturing of Fixtures		20		4
	Assembly Fit		15		5
	CNC Milling/ Turning		10		5
	Precision Filing		15		
	Total Marks		100		
CAD/CAM - 1	Practice on CAD/CAM Software/ Simulation and Try out on Machine		80		20
	Total Marks		100		
OJT	OJT - On the Job Training in the Industry		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 and Evaluation Dept.

Evaluation of Theory and 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 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 customer needs and 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:

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

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

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 and 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

Semester - 3	Module Name: Production Technology - 3	Module Code: CP01306T
Sl. No.	**Module Details**	**Theory Hours 40**
1	Milling -II	5h
2	Grinding-II	9h
3	Broaching	3h
4	Jig boring and Jig grinding	4h
5	Super finishing process	4h
6	Electric Discharge machines	6h
7	Other Manufacturing Processes	9h

Semester - 3	Module Name: Metrology - 3	Module Code: CP01307T
Sl. No.	**Module Details**	**Theory Hours 20**
1	Hardness checking	2h
2	Interferometry	4h
3	Form and position features	6h
4	Miscellaneous measurement	3h
5	Surface texture measurement	5h

Semester - 3	Module Name: Material Technology and Heat Treatment	Module Code: CP01308T
Sl. No.	**Module Details**	**Theory Hours 40**
1	Atomic bonds	2h
2	Crystalline structure	2h
3	Solid solutions, Solid phase and Phase diagram	3h
4	Solidification of metals	2h
5	Heat Treatment	11h
6	Heat Treating equipment	6h

7	Post Heat Treatment	2h
8	Metallurgical microscope	1h
9	Heat Treatment of different materials	4h
10	Possible defects and remedies in Heat Treatment	2h
11	Surface Treatment	3h
12	Planning for Heat Treatment and Case study	2h

Semester - 3	**Module Name: Press Tool Technology - 1**	**Module Code: CP01310T**
Sl. No.	**Module Details**	**Theory Hours 40**
1	Introduction to Press Tools	4h
2	Stock Material	1h
3	Theory of Shearing	1h
4	Cutting force and Cutting clearance	3h
5	Basic Design of Guide Plate Tool	2h
6	Elements of Guide Plate Tool	2h
7	Land and Angular Clearance	1h
8	Basic design of Progressive Tool	2h
9	Strip layouts	5h
10	Die blocks	2h
11	Punches	2h
12	Strippers and Gauges	4h
13	Stoppers	1h
14	Pilots	3h
15	Side cutters	2h
16	Ejectors and shedders	2h
17	Fasteners and dowels	1h

18	Shank	2h

Semester - 3	Module Name: Jigs and Fixtures	Module Code: CP01311T
Sl. No.	**Module Details**	**Theory Hours 40**
1	Jigs and Fixture – an Introduction	4h
2	Planes of movements	2h
3	Possible movements of work piece	1h
4	Locating of work piece	5h
5	Types of jigs	2.5h
6	Types of fixtures	6h
7	Fixture and machine relation	1h
8	Jig and machine relation	1h
9	Element of jig, fixture	6.5h
10	Jig, fixture and cutting tool relation	2h
11	Design steps of jigs and fixtures	6h
12	Materials and heat treatment of jig, fixture elements	2h
13	Failure of jig, fixture	1h

Semester - 3	Module Name: Strength of Materials - 1	Module Code: CP01312T
Sl. No.	**Module Details**	**Theory Hours 20**
1	Simple stresses and strain	8h
2	Direct shear stresses	3h
3	Thermal effect on stress and strain	4h
4	Struts and columns	5h

Semester - 3	Module Name: CAD- Fusion 360 Lab - 3	Module Code: CP01305P
Sl. No.	**Module Details**	**Practical Hours 60**
1	Sketch and Constraints and 3D Modeling	3h
2	Assembly modeling of Jigs and Fixtures	15h
3	Create 3D models of the given components	6h
4	Draw strip layout of different sheet metal components	6h
5	Press Tool Design – Single stage guide plate tools	12h
6	Progressive Press Tool Design – 3 Stage guide plate tools	16.5h
7	Model Test	1.5h

Semester - 3	Module Name: Tool Design Drawing - 1	Module Code: CP01313P
Sl. No.	**Module Details**	**Practical Hours 60**
1	Design of fixtures	10h
2	Design of jigs	10h
3	Design of guide plate tool	8h
4	Press tool with die set	4h
5	Design of progressive tool	28h

Semester - 3	Module Name: Workshop Practical - 3	Module Code: CP01322P
Sl. No.	**Module Details**	**Practical Hours 250**
1	Precision Fit	60h
2	Manufacturing Progressive Tool elements - Operations: Bench work, Conventional and Non- Conventional Machining, CNC Machining and Inspection	190h

Semester - 3	Module Name: Employability Skills	Module Code: CP01323T

Sl. No.	Module Details	Theory Hours 30
1	Diversity and Inclusion, Gender sensitivity PwD etc.	9h
2	Career development & Goal setting	6h
3	Entrepreneurship	6h
4	Analytical thinking & Adaptive Thinking	9h

Semester - 4	Module Name: Mould Technology - 1	Module Code: CP01401T
Sl. No.	**Module Details**	**Theory Hours 40**
1	Plastic in Moulding Industry	4h
2	Injection Moulding Machine	4h
3	Basic Terminology of Injection Moulds	4h
4	Number of Cavities	4h
5	Parting Surface	2h
6	Feed Systems	3h
7	Ejection System	3h
8	Plastic Shrinkage	2h
9	Temperature controlling for Moulds	4h
10	Mould Cycle	2h
11	Split Cavities	4h
12	Side Core and Side Cavity	4h

Semester - 4	Module Name: Production Technology - 4	Module Code: CP01402T
Sl. No.	**Module Details**	**Theory Hours 20**
1	Basic Health and Safety	5h
2	Non-conventional machining	7h

3	Working Effectively with others at work	3h
4	Machine tool Maintenance	3h
5	Additive manufacturing	2h

Semester - 4	**Module Name: Strength of Material - 2**	**Module Code: CP01403T**
Sl. No.	**Module Details**	**Theory Hours 20**
1	Bending stress	8h
2	Torsion of shaft	5h
3	Torsion of springs	7h

Semester - 4	**Module Name: Press Tool Technology - 2**	**Module Code: CP01404T**
Sl. No.	**Module Details**	**Theory Hours 40**
1	Presses	2h
2	Die sets	2h
3	Different types of press tools	3h
4	Compound Tool	2h
5	Comparison of Progressive and Compound tool	1h
6	Bending Tool	7h
7	Deep Drawing	4h
8	Forming – different operation	2h
9	Shaving	2h
10	Fine blanking	4h
11	Unit tooling	2h
12	Forging	2h

13	Extrusion	2h
14	Tooling Material	2h
15	Tool Handling	3h

Semester - 4	**Module Name: CNC Technology**	**Module Code: CP01405T**
Sl. No.	**Module Details**	**Theory Hours 40**
1	Familiarize with the technology of NC/CNC/DNC system	2h
2	Classification of CNC machine	2h
3	Elements of CNC machine	4h
4	Tool and Tool materials used in CNC machine tools	6h
5	CNC Milling	14h
6	CNC Turning	10h
7	Basic CNC Maintenance and Trouble shooting	2h

Semester - 4	**Module Name: Tool Design Drawing - 2**	**Module Code: CP01406P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	Design of Fixtures	10h
2	Design of Jigs	10h
3	Design of Guide plate tool	8h
4	Press tool with die set	4h
5	Design of Progressive tool	28h

Semester - 4	**Module Name: Workshop Practical - 4**	**Module Code: CP01407P**
Sl. No.	**Module Details**	**Practical Hours 200**
1	Assembly and Trail of Progressive Tool	65h

2	Manufacturing of Fixtures	62h
3	Assembly of Fit	25h
4	CNC Milling/ Turning	16h
5	Precision Filing	32h

Semester - 4	**Module Name: CAD/CAM - 1**	**Module Code: CP01408P**
Sl. No.	**Module Details**	**Practical Hours 60**
1	Practice on CAD/CAM Software/ Simulation and Try out on Machine	60h

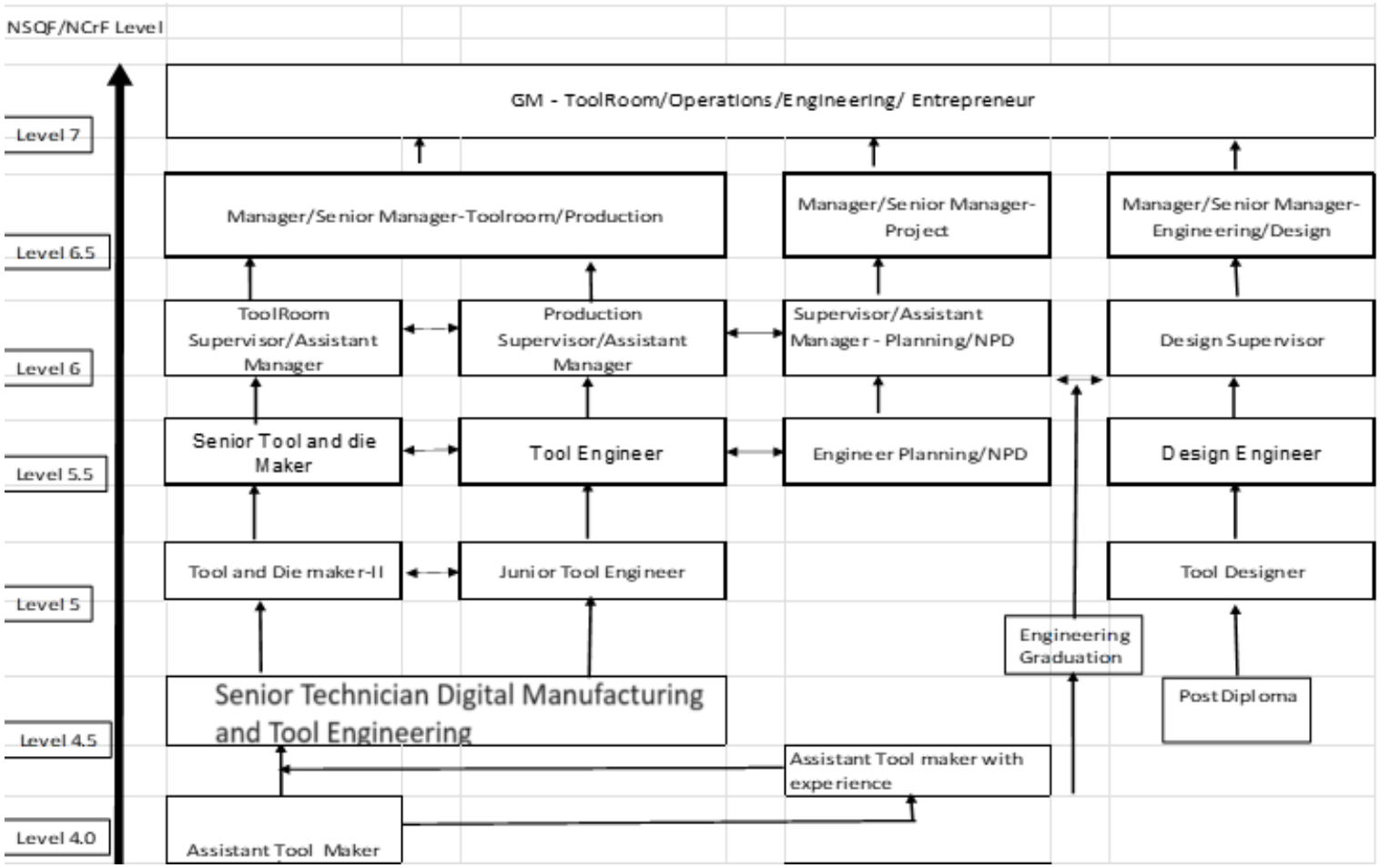
Semester - 4	**Module Name: Employability Skills**	**Module Code: CP01409T**
Sl. No.	**Module Details**	**Theory Hours 30**
1	Financial and Legal Literacy	9h
2	Occupation safety, Health, and Environment education.	9h
3	Digital Literacy Skills	7.5h
4	Essential skills for success.	4.5h

Semester - 6	**Module Name: OJT**	**Module Code: CP01612P**
Sl. No.	**Module Details**	**Practical Hours 90**
1	OJT - On the Job Training in the Industry	90h

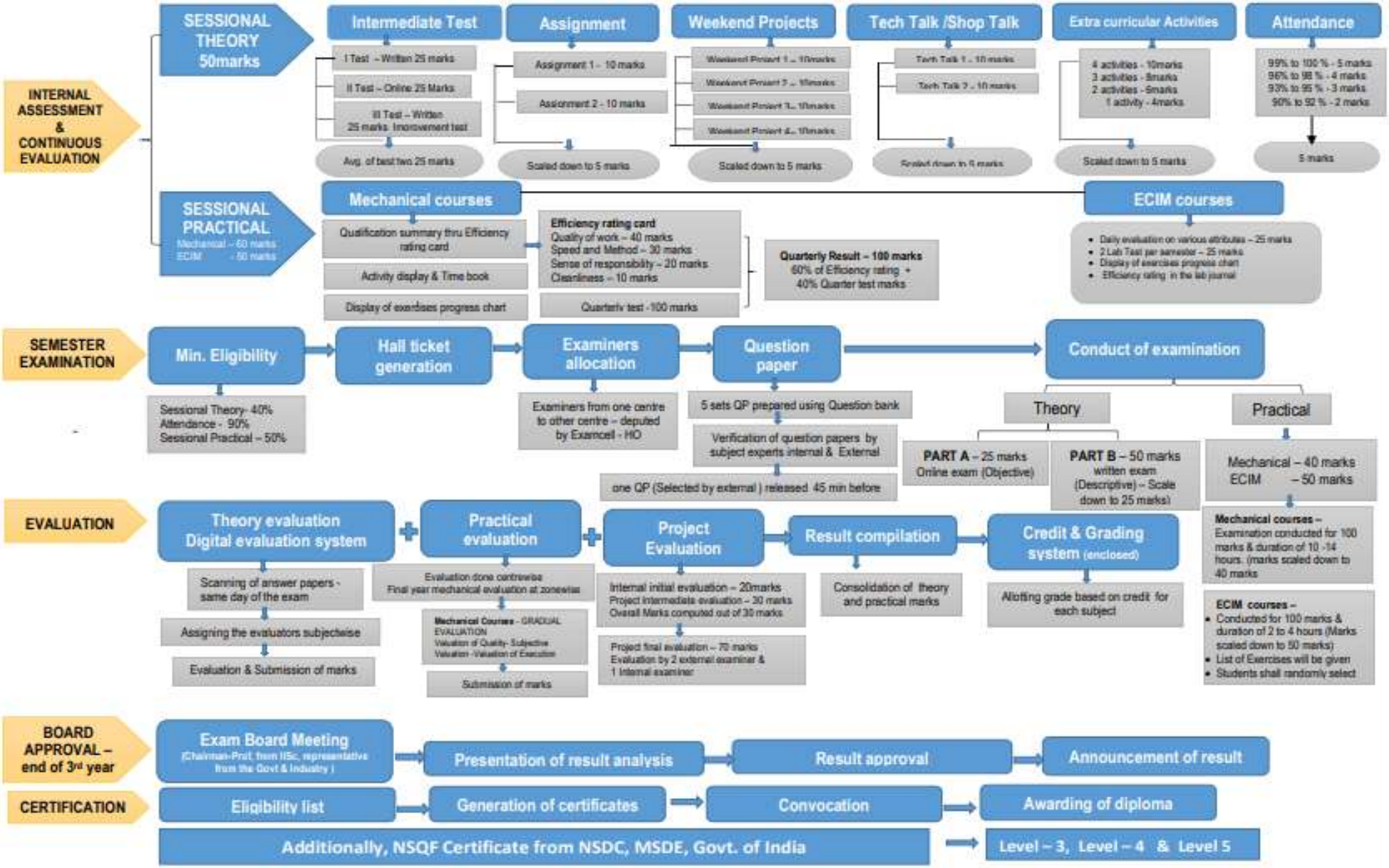
Annexure 9: Career Progression

Job Roles Progression Path

Sector: Capital Goods and Manufacturing



Annexure 10: Assessment SOP



Annexure 11: Occupational Map

Sector Name: Capital Goods and Manufacturing

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 cross cutting the OM Sub-Sectors/Occupations)**	**Occupation 1/ Die and Mould, Fixture Manufacturing**	**Occupation 2/ Die and Mould, Fixture design**
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**			
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 – ToolRoom /Operations Entrepreneur	GM - Engineering/Design Entrepreneur

Level 6.5	**1.** Professional Theoretical Knowledge: A**dvanced multidisciplinary and specialized knowledge** **2.** Professional and Technical Skills/ Expertise: A**dvanced Technical and Managerial Skills** **3.** Employment Readiness & Entrepreneurship Skills & Mind-set: **Leadership, effective resource management** **4.** Broad Learning Outcomes: **Judgement in complex problems** **5.** Responsibility: **Vertical/ Business unit management –Manager or Senior Manager**	1324 2144	Manager/Senior Manager-Toolroom/Production/Projects Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)	Manager/Senior Manager-Engineering/Design Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)
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**	3115 7223 3122	Supervisor/Assistant Manager-Tool room /Production /Projects Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)	Design Supervisor Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)
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**/Tool Engineer	3115 7223	Senior Tool and die Maker/Tool Engineer/Engineer NPD Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)	Design Engineer Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables) (Education Institution)

Level 5		3115 7222	Tool and Die maker-II/Junior Tool Engineer Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)	Tool Designer Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables) (Education Institution)
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**	7222	Tool and Die maker-I /Tool Technician Electives - Metal stamping, Plastic moulding, Die casting, Fixtures, Assembly line. Options - (Automotive) (Electrical) (Aerospace) (Consumer durables)(Education Institution)	Study Post Diploma
Level 4.0	**1.** Professional Theoretical Knowledge: **Range of knowledge** **2.** Professional and Technical Skills/ Expertise: **Range of technical skills** **3.** Employment Readiness & Entrepreneurship Skills & Mind-set: **Work in a team-Follow instructions** **4.** Broad Learning Outcomes: **Carry out Range of tasks with minimum supervision** **5**. Responsibility: Follow instructions **- Jr. Technician**	7222	Assistant Tool maker	

Annexure 12: Key Learning Outcome

SL. NO.	MODULE NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL AND PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
		2nd Year		
1	**Production Technology - 3 (CP01306T)** **Production Technology - 4 (CP01402T)** Understanding the operations of various Conventional, Non-conventional and Special purpose machines	• Explain different milling processes • Identify and Specify milling cutters • Identify nomenclature of milling cutter • Explain feed and depth of cut in milling operations • Mill parts as per drawings • Explain different surface grinding operations • Describe work holding methods in surface grinder • Select grinding wheels as per operations • Dress, True, Balance and Mount Grinding Wheels • Perform different surface grinding operations • Do Surface Grinding of jobs as per drawing • Classify types of Cylindrical Grinding machine • Specify Cylindrical Grinder • Explain different cylindrical grinding operations • Describe work holding methods in cylindrical grinder • Perform different cylindrical grinding operations • Do cylindrical Grinding of jobs as per drawing	Understanding the principles, the types, and the tools used for Conventional, Non-conventional and Special purpose machines. Can provide a solid foundation of technical knowledge that can be applied to many different industries and fields. Identify and select work holding and tool holding devices for Milling Operations Identify and Specify grinding wheels Dress, True, Balance and Mount Grinding Wheels Identify Parts and Functions of the Cylindrical Grinder Identify and Specify grinding wheels Identify Parts and Functions of the Tool and Cutter Grinder Identify and Specify Broaching tools	The knowledge and skills gained from learning Conventional, Non-conventional and Special purpose machines can be applied in a wide range of industries and fields, and can lead to career opportunities in manufacturing, engineering, prototyping, woodworking, metalworking, repair and maintenance, and education and training.

		• Specify Tool and Cutter Grinder • Describe work holding methods in Tool and Cutter Grinder • Select grinding wheels as per operations • Regrind Single Point tool milling cutter, reamers, broaches, etc. • Explain Broaching process • Explain Different types of Broaching machine • Explain Jig boring Operation • Explain Jig grinding Operation • Explain Honing Operation • Explain Lapping Operation • Explain Welding, soldering, brazing, riveting and their applications and advantages • Specify Spark Erosion Machine • Explain working of spark erosion machine • Describe different types and materials for electrode • Design electrodes • Operate Spark Erosion Machine • Able to set Spark EDM with Cutting Parameters • Specify Wire EDM • Explain working of Wire EDM • Describe and specify different types and materials for Wire • Select wires appropriate for the operations • Operate Wire EDM • Able to set Wire EDM with Cutting	Identify parts and functions of Jig boring machine Identify parts and functions of Honing machine Identify parts and functions of Lapping machine Identify parts and functions of Jig grinding machine Identify parts and functions of Spark Erosion Machine Identify parts and functions of Wire EDM Importance of maintenance of machine tools	

		Parameters • Explain the Process of Sandcasting, Investment Casting, Centrifugal casting and Die casting • Explain applications, advantages and disadvantages of Sandcasting, Investment Casting, Centrifugal casting and Die casting • Differentiate between hot working and cold working of metals • Describe merits and demerits of hot working and cold working • Describe the following hot working process Rolling, Forging, Piercing, Drawing, Spinning and Extrusion • Describe the following cold working process cold drawing, cold rolling, bending, squeezing, peening and spinning • Describe the process of Powder Metallurgy • Explain the characters of Powders • Explain the different steps in manufacturing parts by Powder Metallurgy • Explain Process and Operations of the following non-conventional machining Operations Chemical machining, Ultrasonic machining, Abrasive jet machining, Laser beam machining, Electron beam machining, Plasma arc machining, Ion beam machining. • Describe Preventive breakdown Maintenance		

2	**Metrology – 3 (CP01307T)** Applying the prescribed method for measuring various profiles and dimensions using appropriate devices.	• Explain Different methods used for Hardness Checking • Describe Different Hardness checking Processes • Explain Interferometry and Its applications • Describe Form and Position Measuring/Checking Procedure • Explain Instrument and Process of Checking Surface Texture	Understanding the principles of hardness testing, including the different methods available and their advantages and limitations.	Different methods used for hardness checking provides valuable technical and professional skills that are essential in quality control and materials testing roles in various industries, including manufacturing, engineering, and research and development. The knowledge and skills gained from form and position measuring/checking can be applied to perform accurate and repeatable measurements, identify potential issues, and troubleshoot problems in the manufacturing process.
3	**Material Technology and Heat Treatment (CP01308T)** Understanding the heat treatment process	• Explain types of atomic bonds • Describe Crystalline structure of metals • Explain Solid Solutions • Describe Phase Diagram • Explain Solidification of Metals • Explain the Purpose of Heat Treatment • Interpret Iron Carbon and TTT • Describe Heat treatment Processes – Procedure, Structural change, Change in Properties and Application • Select Heat treatment Process for Different Material • State Defects in Heat treatment and Explain Remedial Measures • Explain Types and Applications of Heat treatment Equipment • Explain Post Heat treatment processes • Describe Different Surface Treatment	Awareness on structure of Engineering Materials Give an awareness on heat treatment process of engineering materials	Have a basic knowledge on structure of Materials and heat treatment process. Basic knowledge on defects and remedies in heat treatment Knowledge on Properties, Specification and Application of Materials and their Heat Treatment

		processes and process Applications		
4	**Press Tool Technology - 1 (CP01310T)** **Press Tool Technology - 2 (CP01404T)** Understanding various types of Press tools, their parts, functions. Design and manufacturing of Press Tools	• Explain Press Tool Operation • Describe different types of Press Tool • Select Stock Material for press tool operation • Explain shearing theory and stages of shearing • Explain Cutting Clearance in a Press tool • Effect of Excessive and Insufficient cutting clearance and misalignment of punch and die in Press Tool operation • Identify and appearance characteristics of the component with relation to Insufficient cutting clearance and misalignment of Punch and Die • State relation between piece parts size to punch and die size • Calculate cutting clearance • Describe Importance of land in a Die • Explain angular clearance and its importance • Calculate cutting force for press tool operation • State methods for reducing cutting force • Identify and explain the function of elements of guide plate tool • Describe working principle of progressive tool	Familiarization with types of stock material. Familiarize with theory of shearing. Ability to determine cutting force and cutting clearance. Familiarization of elements of guide plate tool and basic design of press tools. Familiarization with land and angular clearance Ability to design a strip lay out. Familiarization of different types of Punches and Die blocks. Recognition of the function and design of strippers. Recognition of the function and design of stoppers Familiarization with the function and design of the pilots.	Knowledge on press tool operations. Knowledge on different elements of press tools, their types and functions in tool. Apply the knowledge for designing the press tools. Design, Process Plan, Manufacture and Try out different types of Press Tools

		• Identify and explain the function of elements of progressive tool • Describe working principle of Compound tool • Identify and explain the function of elements of Compound tool • Compare Progressive Tool and Compound tool • Determine Economic strip layout • Explain different types of Dies • Explain different types of Punches • Select Punches to suit requirements • Explain function of striper and gauges • Explain function of stoppers • Describe different types of stoppers • Explain purpose of Pilots and their applications • Explain different types of pilots and their functions • Differentiate between direct piloting and indirect piloting • Describe function of Side Cutter and their advantage • Explain function and types of ejectors and shedders • Explain types, functions, specification, and applications of Dowel • Explain types, functions, specification, and applications of Fasteners for Press Tools • Explain Different types of shanks • Determine Location of Shanks • Describe types, parts and functions and specifications of Presses	Ability to design side cutter for a tool. Recognition of the use of ejectors and shedders in a press tool. Familiarization with the shank location	

		• Explain Strip Feeding arrangement • Select Press according to Requirement • Describe Pneumatic Dry Cushion and Hydro pneumatic Dry Cushion • Explain Dry sets and Select Standard Die Set • Explain Terms associate with bending process • Describe Parts and Functions of U bending and V Bending Tools • Develop Blanks for Bend Components • Describe Forming Operation • Describe Shaving Operation • Describe Fine Blanking Operation • Explain Unit Tooling • Describe Forging Tool • Describe Extrusion Tool • Describe criteria for selection of Tool material • Describe Tool Handling Devices		
5	**Jigs and Fixtures (CP01311T)** Understanding various types of Jigs and Fixtures, their parts, functions and design and manufacturing of different Jigs and Fixtures	• Explain the function Jigs and Fixtures • Differentiate between Jigs and Fixture • Describe Advantages of Jigs and Fixtures • Describe the freedom of movement of object • Explain locating methods and locators • Describe different types of clamps and stoppers • Explain types and application of different types of Jigs • Explain types and application of different types of Fixtures • Explain the Jigs and Machine Relation	To learn the difference between jig and fixture. To learn concepts of location and clamping and different elements used for locating and clamping the work piece in a jig, fixture. Familiarize with different types of jig and fixtures Provide fool proofing in Jigs and Fixtures	Ability to understand various types of jigs and fixtures and their parts and functions. Design Process Plan and Manufacture of Jigs and Fixtures

		• Explain the Fixture and Machine Relation • Describe different of Clamps • Explain different types of locating elements • Explain different of drill bushes • Explain Different types of setting elements • Design mounting bases for Jigs and Fixture • Select material and Heat Treatment Process for Jigs and Fixture element • Analyze Failure of Jigs and Fixture	Knowledge on relationship with machine and Jigs and Fixtures Learn how to design jigs and fixture.	
6	**Strength of Materials - 1 (CP01312T)** **Strength of Materials - 2 (CP01403T)** Understanding the behaviour of materials on application of force and determining their parameters	• Explain the Stress, Strain, and its relationship • Describe the Hook's Law, Poisson's Ratio, Bulk Modulus, Lateral Strain, and Volumetric Strain, Shear Modulus • Explain shear stress, Shear strain and its application • Describe Thermal stress and strains. • Define Struts and Columns. Able to understand Different end condition, Buckling load • Explain the bending stress and its equation • Define Moment of inertia, Centre of gravity, Moment of force and centroid. • Explain beams and its type's. Load acting on the beams • Explain shaft • Explain Torsional stress, torsional rigidity, Polar moment of inertia, Power transmitted by shaft	Knowledge on Direct Stress, strain and their relationship. Solve technical problems by using the knowledge on strength of materials Knowledge on thermal effect on stress and strain Knowledge on effect of load on struts and columns	Able to Solve Stress, Strain and Young's Modulus related problems Able to solve numerical problems related to thermal effects Able to solve numerical problem using torsional equation Able to solve numerical problems using bending equations Apply the gained knowledge in deciding the allowable length of slender punches Solve numerical problems related to springs

		• Define spring and its spring • Explain purpose of spring and its application • Explain spring equation		
7	**Tool Design Drawing - 1 (CP01313P)** **Tool Design Drawing - 2 (CP01406P)** **CAD - Fusion 360 Lab (CP01305P)** **CAD/CAM - 1 (CP01408P)** Designing various types of Jigs and Fixtures, Press tools and Moulds	• Explain basic principle to be followed in Design • Design Fixtures • Design Jigs • Design Guide Plate Tool • Design Press Tool with Die set • Design Progressive Tool • Design Compound Tool • Design Bending Tool • Design Drawing Tool • Design Hand Injection Mould • Use Autodesk Fusion 360 • Use of different sketch commands, dimensioning and constraints in fusion 360 • Do Assembly Modelling	Understand the basic principles of designing various types of Jigs and fixtures Understand and apply basic design principles Design different progressive press tools using appropriate calculations Know about factors determining the selection of raw material	Ability to interpret industrial Tool Design drawings Ability to Design Jigs and Fixtures. Ability to design Press tools - guide plate tool and progressive tools. Design Hand Injection Mould Ability to design Jigs and Fixtures, guide plate tools, 3 stage guide plate tools using Fusion software Ability to generate Cam Program using Master Cam
8	**Mould Technology - 1 (CP01401T)** Understanding the types of Polymers and different Moulding process	• Explain Polymerization • Explain types, properties, and applications of thermo plastics and thermoset plastics • Describe Fillers and Additive used in Plastics • Identify Plastics by simple test • Describe different types of Injection Moulding machines • Specify Injection Moulding machine • Identify and explain the function of elements of Injection Moulding machine • Calculate Number of Cavities	Understanding Injection moulding process. Properties, and applications of thermo plastics and thermoset plastics. Identify and explain the function of elements of Injection Moulding machine.	Familiarisation of Plastic materials used in injection moulding. Describe Fillers and Additive used in Plastics. Knowledge of Elements and Systems in Injection mould. Explain Mould with Split Cavities, Side Core and Side Cavity.

		• Determine Parting Surface • Explain Feed System, Ejection System • Determine Core and Cavity Dimensions • Explain Temperature Controlling of Moulds • Prepare Mould Cycle Diagram • Explain Mould with Split Cavities • Explain Mould with Side core and Side Cavity		
9	**CNC Technology (CP01405T)** Programming and operating and basic Maintenance of CNC machines	• Differentiate between NC, CNC and DNC • Classify CNC Machines based on feedback system • Classify CNC Machine Based on Motion Control system • Explain the elements and Functions of CNC Turning Center and VMC • Specify CNC Turning Center and VMC • Identify and Select Tools for CNC Lathe and CNC Milling • Explain materials for CNC Cutting Tools and their applications • Select Tools for P,M,K,N,S,H materials • Study and Familiarize tool catalogue • Do Part Programming in Fanuc/ Sinumerik Control System for Turning • Do Part Programming in Fanuc/ Sinumerik Control System Milling • Operates CNC Turning Center • Operate CNC VMC • Use CAD/CAM Software • Perform Basic Maintenance and Troubleshooting of CNC Machines	Working with CAD/CAM Software. Conversant with Machine control Panel, Setting offset, editing programs, Basic Maintenance and Troubleshooting of CNC Machines Identify CNC machine controls Load and Edit Programs in CNC Machine Interpret alarms in CNC machine	Execution of Programs on CNC Milling and Lathe Machines.

10	**Workshop Practical (CP01322P)** **Workshop Practical (CP01407P)**	Fit – Offset Fit, Universal Fit, Assembly Fit Progressive Tool Bench Fixture	Bench work, Drilling, Milling, Turning, Surface Grinding, Cylindrical grinding	Ability to select appropriate manufacturing equipment and tools for specific tasks.
11	**Employability Skills (CP01323T)** **Employability Skills (CP01409T)** Understand Entrepreneurship skills Ability to understand financial and legal aspects Understand Occupation safety, Health, and Environment related issues. Ability to use Essential skills.	Knowledge on various schemes and institutions promoting Entrepreneurs. Ways of setting enterprise, legal compliances, marketing, and budgeting etc. Knowledge and understanding on personal finance management, investments, returns, basics of taxes, awareness on financial frauds and prevention. Awareness on fundamental rights under the constitution and facilities available for recourse in the event of breach. Knowledge on Occupation safety and health, at workplace, Occupation Hazards, Accident prevention and PPEs, Environment, Pollution and protection of environment, Energy conservation, Global warming, Conservation of natural resources, waste management and disposal, Disaster Management. Understanding balancing Life and Career, Value based decision making, Types of stress and stress management.	Explain the schemes promoted by various support institutions. Budgeting and evaluations. Explain the Occupations hazards and process of mitigation of such hazards. PPEs. Explain environment conservation, and other factors affecting them.	Apply and impart details to other people in the society. Decide, plan and implement various financial management ideas, taxations and benefits and legal compliance in the workplace. Enforce caution against financial frauds and addressal of frauds. Follow all safety norms laid by the industry to develop a safe workplace. Practice stress management techniques to ensure high productivity in the work area.

Annexure: Acronym and Glossary

Acronym

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

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf