**Certificate Course on CNC Lathe**

* Course Id : **MSME/CCCNCL**
* Candidate Eligibility : **Inter / ITI passed or its equivalent.**
* No. Of NOS (If QP) : **4**
* NSQF Level : **4**
* Cost Category : **2**
* Course Duration
	+ Theory duration : **162**
	+ Practical duration : **318**
	+ OJT duration : **120**

**Trainer Qualification Work Experience**

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| --- | --- |
| **Trainer Qualification** | **Work Experience** |
| * Minimum - Diploma/Degree in Mechanical Engineering
* Certified for Job Role: “Diploma in Tool & Die Making” with Minimum acceptance score of 65 %
* Recommended that the Trainer is certified for the Job Role: “Diploma in Tool & Die Making” with Minimum accepted score of 65%.
* Alternatively, must have successfully undergone a CGSC organized TOT workshop on “How to Trainer”.
 | * Minimum 3 to 4 years of industry experience in relevant job role and a Minimum of 3 to 4 years and Training experience in relevant job role.
 |

**CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE**

**Name and address of submitting body:**

**Tool Room & Training Centre, Patna**

**(An Extension Centre of Indo-Danish Tool Room, Jamshedpur)**

**Ministry of MSME, Govt. of India**

**Patliputra Industrial Estate**

**Patna-800013**

**(0612) 2270744**

**Name and contact details of individual dealing with the submission**

**Name : Shri. Ashutosh Kumar**

**Position in the organisation : General Manager (I/c)**

**Tel number(s) : (0612) 2270744**

**Mobile : 7260801191**

**E-mail address : trtcpatna14@gmail.com**

|  |  |
| --- | --- |
| **Qualification Title**  | **Certificate Course on CNC Lathe** |
| **Qualification Code**  | **MSME/CCCNCL** |
| **Nature and purpose of the qualification**  | **Nature: Certificate Course** **Purpose:** Learners who attain this qualification are competent in Programming and operation of CNC Machines and get a job in the CNC machine shop. Qualified learners who attain the above skill can also become an entrepreneur.  |
| **Body/bodies which will award the qualification** | **Tool Room & Training Centre, Patna** **(Certificate Awarded by TRTC, Patna)** |
| **Body which will accredit providers to offer courses leading to the qualification** | **Tool Room & Training Centre, Patna** **(Certificate Awarded by TRTC, Patna)** |
| **Body/bodies which will carry out assessment of learners** | **Examination Cell of Tool Room & Training Centre, Patna**  |
| **Occupation(s) to which the qualification gives access** | **CNC Turning Operator**  |
| **Licensing requirements** | **Not Applicable** |
| **Level of the qualification in the NSQF** | **Level 4** |
| **Anticipated volume of training/learning required to complete the qualification** | **600** |
| **Entry requirements and / or recommendations** | **Inter / ITI passed or its equivalent.****Age 15 years to 35 years.** |
| **Progression from the qualification** | **Job Progression:****After completion of course and after 3 years of field experience the trainee can work as a CNC Machine programmer in CNC machine shop and after 5 years of experience, the person can work as a supervisor in CNC machine shop.** |
| **Planned arrangements for the Recognition of Prior learning (RPL)** | **Yes** |
| **International comparability where known** | **British Columbia Institute of Technology3700 Willingdon Avenue Burnaby, British Columbia** **CNC Machinist Technician Level -3** **CNC**  |
| **Date of planned review of the qualification.** | **January 2020** |

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| **Formal structure of the qualification**  |
| **Title of component and identification code** | **Mandatory/ Optional** | **Estimated size (learning hours)** | **Theory hours** | **Practical hours** | **Level** |
| **1. Engineering Drawing**  | **Mandatory** | **72** | **24** | **48** | **4** |
| **2. Engineering Metrology**  | **Mandatory** | **48** | **24** | **24** | **4** |
| **3. Workshop Calculation**  | **Mandatory** | **48** | **48** | **-** | **4** |
| **4. Workshop Technology**  | **Mandatory** | **48** | **24** | **24** | **4** |
| **5. Conventional Lathe** | **Mandatory** | **72** | **-** | **72** | **4** |
| **6. CNC Turning (Fanuc).** | **Mandatory** | **192** | **42** | **150** | **4** |
| **7. On Job Training** | **Mandatory** | **120** | **-** | **120** | **4** |
| **Total** | **600** | **162** | **438** |  |

**ASSESSMENT**

**Body/Bodies which will carry out assessment:**

Examination cell - *Tool Room & Training Centre, Patna*

**How will RPL assessment be managed and who will carry it out?**

*YES. Learners who have met the requirements of any Unit Standard that forms part of this qualification may apply for recognition of prior learning to the relevant Education body. The applicant must be assessed against the specific outcomes and with the assessment criteria for the relevant Unit Standards.*

**Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.**

**1. ASSESSMENT GUIDELINE:**

 - Criteria for assessment based on each learning outcomes, will be assigned marks proportional to its importance.

 - The assessment for the theory & practical part is based on knowledge bank of questions created by trainers and approved by Examination cell (TRTC, Patna)

 - For each Individual batch, Examination cell will create unique question papers for theory part as well as practical for each candidate at each examination.

 - To pass the Qualification, every trainee should score a minimum of 40% in each Theory and 50% in each Practical subject.

 - Assessment comprises the following components:

>Job carried out in labs/workshop

>Record book/ daily diary

>Answer sheet of assessment

>Viva –voce

>Progress chart

>Attendance and punctuality

**2. ASSESSORS:**

TRTC Patna faculty teaching the Advanced Programming and Operation with CAD/CAM course, also assesses the students as per guidelines set by Examination cell of TRTC. 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 IN THE EXAM:**

Minimum 70% attendance is compulsory for the students to appear for the assessments.

**4. MARKING SCHEME:**

**Semester-I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Method of Assessments** | **Weightage** | **Evaluator** |
| **1** | Practical test | 25 | **Trainer + Moderator (Head of Dept)+ Examiner nominated by Examination cell (TRTC)** |
| **2** | Written test (Trade Theory) | 15 |
| **3** | Communication/Employability skills | 10 |
| **4** | Workshop calculation & Metrology | 10 |
| **5** | Engineering Drawing | 15 |
| **6** | Internal assessment | 25 |
| **Total** | **100** |  |

**5. PASSING MARKS:**

Passing criteria is based on marks obtain in attendance record, term works , assignments, practical’s performance, viva or oral exam, module test, class test, practical exam and final exam

Minimum Marks to pass practical exam – 60%

Minimum Marks to pass theory exam – 40%

Grade Equivalents:-

>85% Ex

>65% & <85% A

>50% & <65% B

>35% & <50% C

<35% D

**6. RESULTS AND CERTIFICATION:**

The assessment results are backed by evidences collected by assessors. Successful trainees are awarded the certificates by TRTC, Patna.

**ASSESSMENT EVIDENCE**

ASSESSMENT EVIDENCE

Assessment evidence comprises the following components document in the form of records:

Job carried out in labs/workshop

Record book/ daily diary

Answer sheet of assessment

Viva –voce

Progress chart

Attendance and punctuality

|  |  |
| --- | --- |
| **Title of Component** | **Certificate Course on CNC Lathe** |
| **Sr.no** | **Outcomes to be assessed** | **Assessment criteria for the outcome** |
| 1 | List different Cutting tooling standards  | * Selection of standard tools/ cutters/Tool Holders as per requirement
* Identify Cutting Tools and Tool Holders from the standard
* Discuss Single point tools operations
* Explain Toolholder Styles
* Define Turning Insert Shapes
* Describe Operating Conditions
* Explain Workholding methods
* Identify and Explain Toolholding Devices
* Explain Cutting Conditions
 |
| 2 | Develop mathematical /Analytical skills | * Describe standard mathematical formulae used in calculation required for machine tool operation.
* Calculations of machining parameters like cutting speed, cutting feed, depth of cut etc.
* Explain Coordinate System
* Describe Machine Geometry
* Discuss Axis - Orientation
* Define Work sketch and Calculation
* Discuss Math in CNC Programming
* Describe Taper Calculation
* Describe Calculation of Traingles
* Explain Inverse Trigonometric Function
 |
| 3 | Develop and execute CNC Machining programme  | * Plan the machining activities before starting them.
* Use appropriate sources to obtain the required information e.g. Numerical control on CNC machine, types of CNC control
* Calculation of technological data for CNC machining.
* check that all the equipment is correctly connected and in a safe and usable working condition
* Calculate parameters like speed feed , depth of cut etc. and set a references for the various operations.
* set up the suitable template/folder
* set up and check that all peripheral devices are connected and correctly operating
* establish coordinate system, orientation and views as per the job
* confirm that the program is as per job specifications and contains all relevant information
* use appropriate techniques to create program that are sufficiently and clearly detailed
* use codes and other references that follow the required conventions
* make sure that programs are checked and approved by the appropriate person
* save the program in the appropriate file type and location
* deal promptly and effectively with problems within your control, and seek help and guidance from the relevant people if you have problems that you cannot resolve
* Shut down the CAM system to a safe condition on completion of the programming activities.
* Prepare programs, demonstrate , simulate and operate CNC lathe, machines for various machining operations.
* Execute program and inspect simple geometrical forms / standard parts
 |
| 4 | Safety and Health practices at the workplace | * Safe handling of tools, equipment & CNC Machines
* & Personal safety tool as per company product requirement. Machining types of CNC Machines advantages & Limitation of CNC computer numerical control applications.
* Future of CNC technology (Advance Knowledge), update technology or latest CNC Systems :- CNC interpolation, open loop & close loop control systems with feedback devices co-ordinate systems & points mode knowledge.
* CNC Machines-Turning Type Axes nomenclature Review assignment/practical/test
* use protective clothing/equipment for specific tasks and work conditions
* state the name and location of people responsible for health and safety in the workplace
* state the names and location of documents that refer to health and safety in the workplace
* identify job-site hazardous work and state possible causes of risk or accident in the workplace
* carry out safe working practices while dealing with hazards to ensure the safety of self and others
* state methods of accident prevention in the work environment of the job role
* state location of general health and safety equipment in the workplace
* inspect for faults, set up and safely use steps and ladders in general use
* work safely in and around trenches, elevated places and confined areas
* lift heavy objects safely using correct procedures
* apply good housekeeping practices at all times
* use the various appropriate fire extinguishers on different types of fires correctly
* participate in emergency procedures
 |
| 5 | CNC PROGRAMMING AND CNC MACHINING - On job training  | * Study of CNC machine, keyboard & specifications, Machine starting & operating in reference point, jog & incremental modes, coordinate system points, assignments absolute & incremental co-ordinate.
* Identification of machines over travel limits & emergency stop, machine parts, mode practice (Jog, MDI, Edit, R.P. Auto, Single Block, MPG) Work & Tool setting CNC m/c part program preparation.
* Linear interpolation, assignments & simulations on software on old program. Circular interpolation, assignment & simulation on old program.
* Work offset & tool offset measurement & entry in CNC control.
* Part program preparation by absolute & incremental programming.
* CNC m/c turning with radius/Chamfer with TNRC editing practice & simulation.
* Chuck removing & its assembly.
* Cutting tool setting
* Work setting
* Program editing & simulation
* Cycle 95-Stock removal cycle OD/ID
* Drilling/boring cycles in CNC turning
* Grooving/Threading on OD/ID in CNC turning
* Offset correction practice
* Size control on CNC machine
* Sub program with repetition
* Threading cycle OD
* Sub program with repetition, sub-program with macro
* Call eccentric turning etc
* CNC turning: Mutlistart threading Programming with variables
* final test & evaluations.
 |
|  | **Means of assessment** Skill performance is assessed by conductingi) Assignment for each semesterii) Written test for each semesteriii) Final exam after completion of both the semestersiv) Practical exam for each semesterv) Final practical exam after completion of both the semestersvi) Viva / Oral Exam |
|  | **Pass/Fail**Passing criteria is based on marks obtain in attendance record, term works , assignments, practical’s performance, viva or oral exam, module test, practical exam and final exam i) Minimum Marks to pass practical exam – 60%ii)Minimum Marks to pass theory exam – 40% |

**Fig. 1. Career Progression of Certificate course in CNC Lathe**



**Course Curriculum**

**Syllabus content with time structure**

**For the course of Certificate Course on CNC Lathe**

**Duration: 600 hrs.**

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| **Session Name: Engineering Drawing** |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (24 hours)** | **Activity (48 hours)** |  | **Practical** | **Theory** |
| **Engineering drawing as a graphical language used by engineers, users and technicians** |  | **State the importance** and objectives of engineering drawing.State the standards used for drawing. | 24 | 48 |
| **Drawing equipments** |  | **Explain the use of**Drawing boardT - squareSet squareMini drafterInstrument boxProtractors French curves Identify the different grades of pencils HB, H, 2H, 3H.Classify the different sizes of drawing sheets according to B.I.S.Describe the layout of Drawing sheets and their contents.Give idea about Letters and numeralsExplain the use of scales – Enlarging, Reducing, full scale and representative fraction. |  |  |
| **Dimensioning Techniques** |  | **State the types of lines** and their uses.Identify different dimensioning methods.Use Chain, parallel and combined dimensioning.Use aligned and unidirectional system of dimensioning in given situation.Use co-ordinate dimensioning, methods of dimensioning Diameter, Radii, Chords, angles. |  |  |
| **Recognize the points in various quadrants** |  | Explain all four quadrantsIdentify Horizontal plane, Vertical plane and Profile plane.Explain the projection of points – front view, top view and side view (both left and right). |  |  |
|  | **Orthographic projection of machine parts** | **State Meaning** of orthographic projectionDraw elevation, plan and side elevation of the machine parts like stepped block, fork lever, bearing block, etc. |  |  |
|  | **Isometric projection and views of solids and machine parts** | **Describe the use of Isometric** scaleDistinguish between Isometric view and Isometric projectionsTo draw the Isometric view of different geometrical objects and machine partsConvert orthographic views into isometric view |  |  |
|  | **Preparation of assembly drawing** | hingeC-clampDrill base and tableTool makers clamp Drill jigPlumber block, etc. |  |  |
| **Surface finish symbols** |  | **Indication**Special surfaceDirection of layMachining allowancePosition of symbolSymbols with inscriptionsAdditional indications |  |  |
|  | **Fits and****Tolerance** | Indications in assembly drawings |  |  |

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| **Session Name: Engineering Metrology** |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (24 hours)** | **Activity (24 hours)** |  | **Practical** | **Theory** |
| **Metrology** |  | **Introduction**Definition of measurementAims of measurementStandards of measurements – primary and electric standards.Methods of measurement – direct and indirect comparison.Precision and accuracySensitivity and repeatabilityErrors in measurementsSystematic errorCalibration procedure in measuring instruments. | 24 | 24 |
|  | **Measuring Instruments, Principle, Construction Least Count + Uses** | **Precision instruments**Linear measurementsNon precision, steel rule, calipers dividers, telescopic gauges, Depth gauge.Micrometers, vernier calipersHeight gaugesSlip gaugesComparators  |  |  |
|  | **Angular Measurements** **Non Precision** | **Protractors** Adjustable bevelEngineers squareCombination set |  |  |
|  | **Precision Angle Measurement** | **Bevel protection,** dividing head sine bar, angle gauges, spirit level clinometers, Auto collimators. |  |  |
|  | **Limits, Tolerances And Fits**  | **Definition – Inter** changeability Basic size – Actual sizeLimits of sizeMaximum limit of sizeMinimum limit of sizeHoleShaftDeviation Upper deviationLower deviation Actual deviationToleranceZero lineFundamental deviationFundamental toleranceToleranced size |  |  |
|  | **Fits And Their Classification** | **Definition of a fit expression** 30H7/g6ClearanceClearance fitMaximum clearanceMinimum clearanceInterference fitMaximum interferenceMinimum interferenceTransition fitHole basis systemShaft basis system  |  |  |
|  | **Gauges** | **Types of gauges**Plain gaugesPlug gaugesSnap gaugesRing gaugeAdjustable typeGap gaugeCombined limit gaugesPosition gaugeTaylor’s principle of gauge design |  |  |
|  | **Comparators**  | **Introduction** Purpose of comparatorsTypes of comparatorsRead type mechanical comparators – Dial indicators, advantages and disadvantages.Working principle of pneumatic comparator and solex air gauge.Optical comparators |  |  |

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| **Session Name: Workshop Calculation**  |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (48 hours)** | **Activity (0 hours)** |  | **Practical** | **Theory** |
| **Trigonometry units and measurement of angles** |  | **To define right angle in** different systems and a radian.Relation between Radians and Degrees – Problems.To derive Arc length = r x 0 and Area of a sector A = ½ r20 and to show radian is a constant angle – Related Problems. | 0 | 48 |
| **Trigonometric ratios** |  | **Definition of Trigonometric** functions as sides of a right angled triangle.To derive Identities – ProblemsTo find Trigonometric Ratios of Standard angles like 00, 300, etc., |  |  |
| **Allied angles** |  | **Rule of signs**Meaning of Allied angles and Derivations of -0, 90, -0, 90 + 0.Formulae of 180 ± 0, 270 ± 0, 360 ± 0, etc. using the formulae of 90±0 |  |  |
| **Mensuration** |  | **Problems based on Allied** angle Problems on Areas and Volumes & other measurements. |  |  |
|  |  |  |  |  |
| **Heights and distances** |  | **Definition of angle of** elevation and depressionIllustration to find heights and distances of objectsProblemsTo write Sin(A-B), Cost(AA\_B) and tan(A-B) by replacing B by –B. To derive ratios of multiple angles like 2A and 3A – ProblemsTo writer half angle formulae from ratios of 2A formulae Problems. |  |  |

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| **Session Name: Workshop Technology**  |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (24 hours)** | **Activity (24 hours)** |  | **Practical** | **Theory** |
|  | **Hand Tools** | **Vices,** Construction parts specification uses of, Bench vice, Leg vice, Pipe vice, Hand vice, Pin vice,Tool makers vice, Care of vices, Vice clamps, Hammers, Ball peen , Cross peen, Straight peen, Soft hammers, Files, Parts, size, cut of teeth, shapes, filing, methods of filing, care, special purpose file and needle files. Centre punches, Dot punch, Prick punch, Scrapers, Shapes, Scraping, Frosting or flowering, Hacksaws, Definition, types of frames, Parts of a blades, Kinds of blade, Types of bladeTeeth arrangements, Sawing - Power hacksaw, parts, function of type of blade, band saw, parts function, types of blade. Pliers, Spanners, Screw drivers,. | 24 | 24 |
|  | **Marking Tools** | **Scribers,** Try squares, parts of uses, Jenny calipers, parts uses calipers O/S I/S, dividers. Surface plates, material, constructions, specification and uses. Parallel blocks, ‘V’ blocks, Scribers, Features, uses, Surface gauges, types, ordinary universal, parts and uses. Angle plate, features, functions, types of uses.  |  |  |
|  | **Lathe Machine** | **Centre lathe and its parts**, Specification of a center lathe, Parts, head stock, Lathe bed, CarriageFeed mechanism, Tool paste, Tail stock, work holding devices, Chucks – 3 jaws, 4 jaws, Self centringIdependent, Face plate. Work supporting accessories, Catch plate, Driving plate, Tail stock centerLathe dogs, Fixed study rest, Traveling study rest, Collets, Mandrels. |  |  |
| **Turning tools and Tool Geometry** |  | **HSS, Carbide, Diamond**, Ceramic, Tool angles and their functions, Roughing tools, Finishing toolsPlain turning (1) L.H. tool, (2) R.H. tool, Facing tool, Threading tool, Boring tool, Profile tool, Parting of or end cutting tool. Tool holders, Holders for tool bit, Tool post, Clamping plate, Four way tool post, Single roller knurling tool holder, Joint type knurling tool holder, Revolving head knurling tool. |  |  |
| **Turning operations & safety** |  | **Plain, Steps, Square shoulder,** Filleted shoulder, Beveled shoulder, Parting, Boring, Grooving, Facing, Threading, Profile, Drilling, Tapping, Reaming, Counter boring, Knurling, Trepanning operation.  |  |  |
| **Taper Turning Methods** |  | **Form tool method,** Compound slide method, Offset tail stock, Taper turning attachment, Effect of tool position, Taper calculations, eccentric turning, Calculations, Aids, Inspection, copy turning, Equipment, Hydraulic, Mechanical, Templates. |  |  |
| **Cutting Speed** |  | **Length in** m/minMaterial of work pieceTool materialCross section of chipsCoolingDesign of machineCalculation OF R.P.M Cutting speedDiameter of work pieceTablesFeeds & depth of cutMaterialCutting ToolsCutting anglesFeed in mm per revolutionCalculation of machining time Setting timeMachining timeAuxiliary timeDelay timeTotal time |  |  |
| **Special lathes**  |  | **Definition** Parts |  |  |
| **Safety** |  | Rules and regulations**Rules and regulations**Definition, Parts Specification, Types of Planning MachinePlanner Operation |  |  |
| **Work holding devises** |  | Machine viceDirect clamping3-jaw chuck4-jaw chuckmilling fixturesAngle plates |  |  |
| **Speeds & Feeds** |  | **Cutting Speed Calculations**Milling FeedsDepth of cutFeed rate mm/minFeed / ToothFeed / Cutter revolutionFeed / minuteChip formationMachine powerSurface finishRoughness waviness revolutionCutting fluidAdvantages & characteristics of a cutting fluidTypes, functions and application of cutting fluid |  |  |
|  |  | SAFETY Rules and regulations |  |  |

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| **Session Name: Conventional Lathe** |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (0 hours)** | **Activity (72 hours)** |  | **Practical** | **Theory** |
|  | **Conventional Lathe** | **Lathe machine** and its parts.Lathe machine operations.Lathe accessories and attachments.Types of lathes.Single Point Cutting Tools and Multi Cutters. | 72 | 0 |

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| --- |
| **Session Name: CNC Turning (Fanuc)** |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (0 hours)** | **Activity (144 hours)** |  | **Practical** | **Theory** |
| **CNC Turning (Fanuc)** |  | 1. Introduction to CNC Technology
2. Advantages & Disadvantages
3. NC & CNC Machine
4. Elements of CNC Machine
5. Positional Data(Absolute & Incremental Dimensioning)
6. Introduction to Programming Words
7. Functions of G- Code & M- Code.
8. Tool Selection & Tool Offset, Tool Nose Radius
9. Compensation (TNRC)
10. ISO Specification for Inset, Cutting Parameters
11. Data Input Panel & their uses
12. Canned Cycles - Roughing, Pattern Repeating, Drilling, Peck Drilling, Threading cycle etc.
13. Boring Cycle, Facing, Grooving
14. Taper Turning**,** Profile boring
15. Sub- Programme & Nesting with example.
 | 150 | 42 |
|  | **Machine Practice** | 1. Concept Of Operating a CNC Machine
2. Operating Practice on CNC Mirac (Turning) Machine,
3. Machine Homing,
4. Tool Offset,
5. Tool Changing,
6. Profiling Practice,

drilling ,Boring etc. Independently do programming and machining the job on the machine. |  |  |

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|  **Session Name: On Job Training** |
| **Practical competencies****(includes demonstration and activity)** | **Underpinning Knowledge** | Duration (in hours) |
| **Demonstration (0 hours)** | **Activity (120 hours)** |  | **Practical** | **Theory** |
| **On Job Training** | CNC PROGRAMMING AND CNC MACHINING -On Job Training | 1. Introduction to CNC technology – CNC machines & controls.
2. History & development of CNC technology.
3. Conventional Vs. non-conventional machine tool.
4. Numerical control on CNC machine tools CNC control and CNC Control and types of CNC control
5. Calculation of technological data for CNC machining.
6. CNC clamping system.
7. Implementation of JH for CNC
8. Basic health and safety
9. CNC programming basics.
10. Introduction to manual NC programming
11. Manual NC programming for lathe & milling machines.
12. Application Numerical Control, Advantages, & Disadvantages, Adoptive Control System.
 | **120** | **0** |

**External assessments**

|  |  |  |
| --- | --- | --- |
| **Comp. NO.** | **ASSESSABLE OUTCOME** | **ASSESSMENT RESULT** |
| **GENERIC** |
| 1 | Follow work ethics and identify necessary materials and tools | 5 |
| 2 | Perform task with due consideration to safety rules in coordination with team and following government regulations  | 5 |
| 3 | Apply professional knowledge & technical knowledge while performing the task | 5 |
| 4 | Should be able to work effectively in team to deliver desired results at workplace | 5 |
| 5 | Maintain regularity at the workplace. | 5 |
| 6 | Able to work observing personal health, safety & environmental protocol at Workshop | 5 |
| SPECIFIC |
| 1 | Precision Machining Capability  | 35 |
| 2 | CNC Lathe (Fanuc) Capability | 35 |
|  | **External Assessment Result** | **100** |

**EXAMINATION**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No.** | **COURSE CODE** | **COURSE NAME** | **Examination Scheme** | **Total Marks** |
| **Theory** | **Practice** |
| **Sessional** | **Semester Exam** | **Sessional** | **Semester Exam** |
| **Max. Marks** | **Min. to Pass** | **Max. Marks** | **Min. to Pass** | **Max. Marks** | **Min. to Pass** | **Max. Marks** | **Min. to Pass** |
| 1. | CCCNCL -01 | Engineering Drawing-Theory | 10 | 4 | 30 | 12 | - | - | - | - | 40 |
| 2. | CCCNCL -02 | Engineering Drawing-Practical | - | - | - | - | 20 | 12 | 40 | 24 | 60 |
| 3. | CCCNCL -03 | Engineering Metrology -Theory | 10 | 4 | 30 | 12 | - | - | - | - | 40 |
| 4. | CCCNCL -04 | Engineering Metrology - Practical | - | - | - | - | 20 | 12 | 40 | 24 | 60 |
| 5. | CCCNCL -05 | Workshop Technology - Theory | 10 | 4 | 30 | 12 | - | - | - | - | 40 |
| 6. | CCCNCL -06 | Workshop Technology - Practical | - | - | - | - | 20 | 12 | 40 | 24 | 60 |
| 7. | CCCNCL -07 | Workshop Calculation | 40 | 16 | 60 | 24 | - | - | - | - | 100 |
| 8. | CCCNCL -08 | Conventional Lathe (Practical) | - | - | - | - | 40 | 24 | 60 | 36 | 100 |
| 9. | CCCNCL -09 | CNC Turning (Fanuc) Practical | - | - | - | - | 40 | 24 | 60 | 36 | 100 |
| 10. | CCCNCL -09 | On Job Training | - | - | - | - | 40 | 24 | 60 | 36 | 100 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl. No** | **Process** | **Professional Knowledge** | **Professional Skills** | **Core Skill** | **Responsibility** |
| 1. | Develop mathematical /Analytical skills.Develop and execute CNC Machining programme.Health and safety practices at the workplace | The material need to be machined and tool materials which requires knowledge of facts, principles processes and general concepts in working field.CNC operator (Turning ) should have complete knowledge of CNC Machining. | The ability to apply practical knowledge and professional skill in interpreting the drawing for machining operations.The ability to identify various operations required to make the job and further be able to sequence the same. Use different types of measuring instruments to maintain the desired quality. | Calculate the machining parameters like cutting speed, feed and depth of cut.Communicate to the supervisors/ co-workers if anything goes wrong during the process.Aware about the social as well as environmental situations during working. | Identify the drawing properly, create model and generate program for the particular profile on the work piece independently and solve the related problems of the co-workers.Check-up procedures to ensure that project objectives are finished within specified time frames are developed. |
|  | Level-4 | Level-4 | Level-4 | Level-4 | Level-4 |