<table>
<tr><td>1</td><td>Name of Course</td><td>CERTIFICATE COURSE IN CNC PROGRAMMER CUM OPERATOR (W.E.F. 2017-2018)</td></tr>
<tr><td>2</td><td>Couse code</td><td>303177</td></tr>
<tr><td>3</td><td>Max No of Students Per Batch</td><td>25</td></tr>
<tr><td>4</td><td>Duration</td><td>6 Months</td></tr>
<tr><td>5</td><td>Type</td><td>Part Time</td></tr>
<tr><td>6</td><td>No of Days/Week</td><td>6 Days</td></tr>
<tr><td>7</td><td>No of Hours Per Day</td><td>4 Hours</td></tr>
<tr><td>8</td><td>Required Space</td><td>Class Room – 200 sq.ft,
<u>Laboratory – 300 sq.ft</u>
Total – 500 sq.ft</td></tr>
<tr><td>9</td><td>Minimum Entry Qualification for Student</td><td>SSC / HSC + 1 Year Experience in related field
ITI Machining Group / HSC (Voc) Mechanical Group
Diploma & Degree in Engg. (Mechanical / Automobile)</td></tr>
<tr><td>10</td><td>Objective of Course</td><td>To Create man power in Machining and Manufacturing Industry.</td></tr>
<tr><td>11</td><td>Employment Opportunity</td><td>Automobile Industry , Manufacturing industries, etc.</td></tr>
<tr><td>12</td><td>Teacher’s Qualification</td><td>Diploma /Degree in Mechanical /Automobile with One Year Experience in CNC field.</td></tr>
<tr><td>13</td><td>Training System</td><td>Training System Per Week
<table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>06 Hrs</td><td>18 Hrs</td><td>24 Hrs</td></tr></table></td></tr>
<tr><td>14</td><td>Exam. System</td><td><table>
<tr><th>Sr. No.</th><th>Paper Code</th><th>Name of subject</th><th>Th /PR</th><th>Hours</th><th>Max. Marks.</th><th>Mini. Marks</th></tr>
<tr><td>1</td><td>30317711</td><td>CNC Programmer Cum Operator</td><td>TH-I</td><td>3 hrs.</td><td>100</td><td>35</td></tr>
<tr><td>2</td><td>30317721</td><td>CNC Programmer Cum Operator</td><td>PR-I</td><td>8 hrs.</td><td>300</td><td>150</td></tr>
<tr><td></td><td></td><td>Total</td><td></td><td></td><td>400</td><td>185</td></tr>
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CERTIFICATE COURSE IN CNC PROGRAMMER CUM OPERATOR

Theory - I & Practical - I

Practical	Theory
SIEMENS CNC CONTROL-TURNING .(Sinumerik-802D-T or latest)	**CNC SIEMEN'S CONTROL - TURNING**
Study of CNC machine, key board & specifications Machine starting & operating in Reference Point, JOG, and Incremental Modes Co-ordinate system points. Absolute and incremental co-ordinate assignments, machine part knowledge. Identification of machine over travel limits and emergency stop. Work and tool setting .CNC M/C Part program preparation, Editing Simulation & Automatic Mode Execution: machine lock and machine unlock practice Simple turning & Facing (step turning)	**Safety Precautions** Safe handling of tools, equipment & CNC machines, Conventional & CNC machining, types of CNC machines, advantages & limitations of CNC, computer numerical control applications. M/C Part theory. **CNC systems** CNC interpolation, open loop & close loop control systems. Co-ordinate systems and Points. CNC machine specification and machine elements. CNC Machines – Turning - Milling,- Types , Machine axes. Review, assignment / practice, Test (edit, jog, single block, Auto, MPG, MDl,R.P.)
Linear interpolation, assignments and simulations on soft ware. Circular interpolation, assignment and simulations on soft ware. Work off set measurement and entry in CNC Control. Tool off set measurement and entry in the control Part program preparation, Simulati on &Automatic Mode Execution CNC M/C. Turning with Radius / chamfer with TNRC Review, assignment / practice, Test	**CNC Control Hardware and operating Software** NC verses CNC Systems The CNC Machine Control Unit organization. CNC Software organization. Input Media Processing of the CNC System CNC Machine working principle. Zero off sets and tool off sets in SIEMENS CNC TURNING. Feedback devices for CNC control. Tool Nose Radius Compensation (TNRC).
Linear interpolation, and simulation. Assignment. Circular interpolation, and simulation. Assignment. Chuck removal and mounting on CNC Lathe. Tool change in CNC turning & MPG mode operation. Manual Data Input (MDI) / MDA mode operations and checking of zero offsets and tool offsets. Part program preparation, Simulation & Automatic Mode Execution Of CNC Machine Practical Ex: programming contours with TNRC etc	**Planning for CNC operations** Part Features identification and process selection. Processes sequencing . Tool path planning. Work-piece zero points and ISO/DIN G and M codes for CNC. Stock removal cycle in CNC turning for OD /ID operation. Tooling system for turning and tooling strategies for CNC turning machines. Drilling / Boring cycles in CNC Turning

Geometry and wear offset correction. Part program preparation, Simulation &Automatic Mode Execution of CNC Machine Exercises : stock removal cycle OD Drilling / boring cycles Stock removal cycle ID etc Review , assignment / practice, Test	Cutting tool materials for CNC Turning and its applications. Component Materials. ISO codes for carbide indexable inserts and tool holders for turning. Tooling systems for CNC TURNING Centers. Cutting parameters selection and process planning. Tools layout and process sheet preparation . Using Sub Programs & Cycles in the Main Program. Blue print programming/ Direct dimension programming Review, assignment / Test
Preparations of part programs for thread cutting for CNC turning centers and simulation on computers. Machining of Part program exercises of CNC TURNING practical Grooving and thread cutting OD Grooving and thread cutting ID Threading cycle OD Sub program with repetition Sub program with macro call. Eccentric turning etc	Grooving/Threading Tools, Processes and Tool selection. Programming for Grooving/Threading on OD/ID in CNC Turning. Trouble shooting in CNC Turning. Tool wear Patterns and optimization of cutting parameters. Factors affecting Turned part quality/ productivity. Tapping / rigid tapping on CNC turning.
CNC turning exercises: Multistart threading Programming with variables. Project work : programming & DNC operations. Final test and evaluations.	Programming with variables and custom macros. Program data transfer from PC to CNC machines and DNC operations. Program preparation with CAD/CAM.
Study of CNC machines, key boards & specifications. Machine starting & operating in Reference Point, JOG, Incremental Modes Co-ordinate system points, assignments Absolute and incremental co-ordinate assignments. Polar co-ordinate points , assignments, machine part knowledge Identification of machine over travel limits and emergency stop. Work and tool setting . Work and tool setting, Part programme editing CNC M/C Exercises.machine lock and unlock practice Part program preparation, Simulation & Automatic Mode Execution: Simple turning & Facing , Step turning etc.	**Turning Fanuc** **Safety Precautions** Safe handling of tools, equipment & CNC Lathe with FANUC CNC Oi -T **CNC system organization & specification.** Co-ordinate systems and Points. , Machine axes. Polar co-ordinate points.CNC machine specification and Machine elements. Review, assignment / practice, Test

Linear interpolation, assignments and simulations. Circular interpolation, assignment and simulations. Work off set measurement and entry in CNC Control. Tool off set measurement and entry in the control Simulation software Program entry and editing. Partprogram preparation, Simulation & Automatic Mode Execution Of CNC Turning Practical Exercise: Turning with Radius / chamfer with TNRC etc Review, assignment / practice, Test	**CNC Control Hardware and op erating Software** CNC Software organizatio n . Input Media and tape formats Feed Drives and spindle drives. Machine tool elements. . CNC Machine working principle. Zero off sets and tool off sets in FANUC CNC Turning. Feedback devices for CNC control. **TPM in CNC.** Tool Nose Radius Compensation (TNRC).
Linear interpolation, and simulation. Assignment Circular interpolation, and simulation. Assignment Chuck removal and mounting on CNC Lathe. Tool change in CNC turning/milling & MPG, MDI mode operation. Zero offsets and tool offsets measurement on tool presetter. Preparation of simple turning and facing program. Automatic mode operation of CNC Machine Exercise : Radius programming contours with TNRC etc.	Cutting tool materials for CNC Turning and its applications. Component Materials. ISO codes for carbide indexable inserts and tool holders for turning. Tooling systems for CNC TURNING Centers. Zero offsets and tool offsets. Cutting parameters selection and process planning. Tools layout and process sheet preparation. Using Sub programs & Cycles in the Main Program. Direct dimension programming. Review, assignment / Test.
Geometry and wear offset correction. Part program preparation, Simulation & Automatic Mode Execution of CNC Machine Exercises : Stock removal cycle OD Drilling / boring cycles Stock removalcycle ID etc Review, assignment / practice, Test Tapping / rigid tapping on CNC turning. Industrial visit	**Planning for CNC operations** Work-piece zero points and ISO / DIN G and M codes for CNC. Processes sequencing, Tool path planning for practicals Stock removal cycle in CNC turning for OD /ID operation. Tooling system for turning and tooling strategies for CNC turning machines. Drilling / Boring cycles in CNC Turning
Simulation and machining of Part program exercises : Grooving and thread cutting OD & ID Threading cycle OD Sub program with repetition, Sub program with macro call. Ecentric turning etc Industrial visit	Grooving / Threading Tools, Processes and Tool Selection. Programming for Grooving / Threading on OD/ID in CNC Turning. Trouble shooting in CNC Turning. Tool wear Patterns and optimization of cutting parameters. Factors affecting Turned part quality/ productivity. Tapping / rigid tapping on CNC turning.

CNC turning exercises: Multistart threading, Programming with variables. Etc. **Project** work : programming & operations. Final Test and evaluations.	Programming with variables and custom macros. Program data transfer from PC to CNC machines & DNC operations. Program preparation with CAD/CAM
Study of CNC Machining centre, key board & specifications. Machine starting & operating in Reference Point, JOG, Incremental Modes. Co-ordinate system points, assignments and simulations. Absolute and incremental programming assignments and simulations. Polar co-ordinate points , assignments and simulations. Identification of machine over travel limits and emergency stops. Work and tool setting . Automatic Mode operation: Face Milling etc.	**Milling Fanuc Control** **Safety Precautions** Safe handling of tools, equipment & CNC machines, CNC Mill with FANUC CNC CONTROL- (Fanuc-0i-M latest) CNC Machine & Control specifications. CNC system organization Fanuc-0i-M**.** Co-ordinate systems and Points. CNC Machines Milling,Types , Machine axes. Review, assignment / practice, Test
Linear interpolation, assignments and simulations.- Milling Circular interpolation, assignment and simulations.- Milling Work off set measurement and entry in CNC Control. Tool off set measurement and entry in the control. Program entry & editing. Part program preparation, Simulation & Automatic Mode Execution Of CNC Machine Practical EX.: Chamfering and end milling with CRC etc Review, assignment / practice, Test	**CNC Control Hardware and operating Software** CNC Software organization. Input Media and tape formats Feed Drives and spindle drives. Machine tool elements. . CNC Machine working principle. Zero off sets and tool off sets in FANUC Milling. Feedback devices for CNC control. TPM in CNC.
Linear interpolation, and simulation. Assignment - Milling Circular interpolation, and simulation. Assignment - Milling Tool change in CNC milling & JOG, INC,MPG mode operation. Manual Data Input mode operations & checking of zero offsets and tool offsets. Preparation of part programs for Exercises and computer simulations. Automatic mode execution of CNC Machine Exercises with Block Search and restart: End milling with polar co-ordinates. Simple drilling-G 81. etc	Cutting tool materials for CNC Milling. and its applications. Component Materials. ISO codes for carbide indexable inserts and tool holders for Milling. Tooling systems for CNC Machining Centers. Cutter Radius Compensation (CRC). Cutting parameters selection and process planning. Tools layout and process sheet preparation . Using Sub Programs & Cycles in the Main Program. Review assignment / Test

Geometry and wear offset correction. Part Program Preparation, entry and simulation on CNC Mill & on Computers. CNC Milling Machine Exercises : Chamfer and counter-sink drilling. Deep hole drilling G 83. Threading and tapping G 84. Boring cycles G 85 – G 89. Review, assignment / practice, Test	**Planning for CNC operations-Milling.** Part Features identification and process selection. Processes planning & tool selection for the practicals Work-piece zero points and ISO/DIN G and M codes for CNC milling. Machining parameters for milling. Polar coordinate & Direct dimension programming. Work locating principle and locating devices for CNC milling. Drilling / Boring cycles in CNC Milling.
Preparations of part programs for thread cutting / thread milling for CNC machining centers. Part Program Preparation, entry and simulation on CNC Mill & on Computers for Part program exercises. Automatic mode execution of CNC Machine Exercises With Block Search and restart: Sub program/ repetition and macro call. Circular and rectangular pockets machining. Drilling milling patterns. Thread milling etc.	Grooving / Threading Tools, Processes and Tool selection. Programming for Grooving / Threading on OD/ID in CNC Milling. Helical Interpolation and Thread Milling, advantages and limitations in CNC Milling. Machining of rectangular / circular pockets on CNC milling. Drilling, milling patterns on CNC milling. Rigid tapping on CNC milling.
CNC Machining of Custom Macro program G 65. **Project Work :** programming operations. Final test and evaluations.	Programming with variables and custom macros on Fanuc CNC. Program data transfer from PC to CNC machines and DNC operations.
SIEMENS CNC CONTROL- Milling. (Sinumerik-802D- or latest)	
Study of CNC Machining centre, key board & specifications. Machine starting & operating in Reference Point, JOG, Incremental Modes Co-ordinate system points, assignments and simulations. Absolute and incremental programming assignments and simulations. Polar co-ordinate points, assignments and simulations. Identification of machine over travel limits and emergency stops. Work and tool setting. Automatic Mode operation: Face Milling etc.	**<u>Milling Siemens Control</u>** **Safety Precautions** Safe handling of tools, equipment & CN C machines, CNC Mill with SIEMENS CNC CONTROL (sinumerik 802D-M or latest) CNC Machine & Control specifications. CNC system organization Co-ordinate systems and Points & Polar coordinates. CNC Machine axes designation Review, assignment / practice, Test

Linear interpolation, assignments and simulations.- Milling Circular interpolation, assignment and simulations.- Milling Work off set measurement and entry in CNC Control. Tool off set measurement and entry in the control. Program entry & editing. Part program preparation, Simulation & Automatic Mode Execution Of CNC Machine Practicals : Chamfering and end milling with CRC etc. End Milling with Polar coordinates Review, assignment / practice, Test	**CNC Control Hardware and operating Software** CNC Software organization . Input Media and tape formats Feed Drives and spindle drives. Machine tool elements. . CNC Machine working principle. Zero off sets and tool off sets in FANUC Milling. **Feedback devices for CNC control** TPM in CNC
Linear, Circular interpolation, and simulation - Assignments Tool change in CNC milling & JOG, INC,MPG mode operation. MDI mode operations and checking of zero offsets and tool offsets. Preparation, simulations of part programs Exercises in Automatic mode execution with Block Search and restart : End milling with polar co-ordinates. Simple drilling-G 81 cycle. Chamfer and counter-sink drilling. Deep hole drilling G 83. Tapping G 84 cycles.	Cutting tool materials for CNC Milling. and its applications. Component Materials. ISO codes for carbide indexable inserts and tool holders for Milling. Tooling systems for CNC Machining Centers. Cutter Radius Compensation (CRC). Cutting parameters selection and process planning Tools layout and process sheet preparation . Using Sub Programs & Cycles in the Main Program. Review, assignment / Test
Geometry and wear offset correction. Machining of CNC Exercises : Boring cycles G 85 – G 89 cycles. Threading and Thread milling etc Rigid tapping on CNC milling Review, assignment / practice, Test	**Planning for CNC operations** Processes sequencing & tool selection (Tool path planning. Work-piece zero points and ISO/DIN G and M codes for CNC milling. Machining parameters for milling. Work locating principle and locating devices for CNC milling. Drilling/Boring cycles in Sinumerik CNC Milling. Grooving/Threading Tools, Processes and Tool selection. Programming for Grooving / Threading on OD/ID in CNC Milling. Helical Interpolation and Thread Milling, advantages and limitations in CNC Milling.

Automatic mode execution of CNC Machine Exercises With Block Search and restart : Sub program/ repetition and macro call. Circular and rectangular pockets machining. Drilling milling patterns etc. Industrial visit	Machining of rectangular / circular pockets on CNC milling. Drilling, milling patterns on CNC milling.
Project Work : programming and operations.	Programming with variables and custom macros on Fanuc CNC. Program data transfer from PC to CNC machines and DNC operations

LIST OF TOOLS, MACHINERY, EQUIPMENTS

Sr.No.	Name of items	Qty.
1	3 phase Electrical supply is required for CNC	01 No.
2	CNC 2 axes Turning Centre with Fanuc Oi – Mate TC / Siemens Sinumerik 802 D (one each) Or latest	01 No.
3	CNC system and with required cutting tools and Tooling Package Installation and commissioning **(Capacity : Intermediate Production Machines) with simulation software, voltage stabilizer.**	01 No.
4	CNC part program – Simulation soft wares with CAD / CAM facility for Siemens Sinumerik 80 2 D / FANUC Oi MB Turning module - 2 axes - 1 Licenses , Milling modules – 4 axes - 1 Licenses	01 No.
5	Latest technology of laptop with licensed - 4 GB RAM ITB HDD compitable for CAD - CAM software	01 No.
6	Tool cabinet	01 No.

Sr.No.	Workshop Furniture	Qty.
1	Suitable Work Tables with vices	As required.
2	Stools / Chairs	25 Nos
3	Discussion Table	1 No.
4	Tool Cabinet	2 Nos
5	Trainees locker	2 Nos
6	Fire fighting equipment, first aid box etc	As required
7	Book shelf (glass panel)	1 No.
8	Storage Rack	As required
9	Storage shelf	As required

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