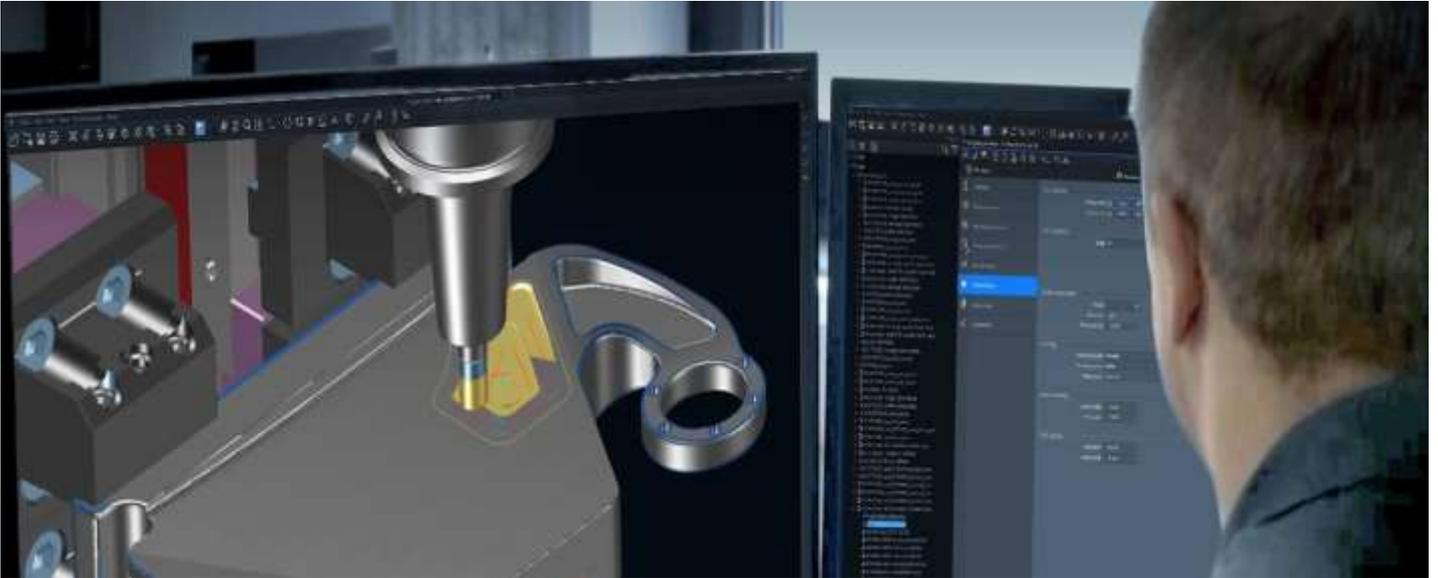


MODEL CURRICULUM



Qualification Name:
CNC PROGRAMMER -TOOL ROOM

Qualification Code:

Version: 2.0

NSQF Level: 4.5

Model Curriculum Version: 2.0

Submitted By:

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NOS / MODULE TEMPLATE

NOS / Module: Understand the Concept of Production Process

NOS /Module Code: MSME/ADCNC/01

Outcomes:

After completion of course Student should be able to:

- Understand about the basic norms of an organization
- Understand about the environmental sustainability
- Understand an implement various activities involved in 5S
- Understand about the safety rules
- Explain the use of first aid and safety equipment/PPE
- Understand the Waste disposal techniques
- Explain Lathe, Milling, Grinding ,Drilling Machine and its parts
- Explain various operations performed on conventional Lathe, Milling, Grinding ,Drilling machine
- Understand about engineering materials, their classification
- Properties and applications in the day to day technical application
- Preparation of materials by using furnace

Theory Hours: 60

Practical Hours: NA

Theory Marks: 100

Practical Marks: NA

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hours	TH Marks
UNIT-I	Introduction	<p>After completion of course Student should be able to:</p> <ul style="list-style-type: none"> • Understand the Importance of trade training, List of tools & Machinery used in the trade. • Health & Safety: Introduction to safety equipment's and their uses. • Basic Importance of housekeeping & good shop floor practices. Health, Safety and Environment guidelines, legislations& regulations as applicable. • Disposal procedure of waste materials like safety introduction. • Understand about the Quality • Understand the quality organization • Understand about the quality system • Explain 7 QC Tools 	<p>Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept& its application. Response to emergencies e.g.; power failure, fire, and system failure.</p> <p>Personal protective Equipment's (PPE):- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Use of Fire extinguishers.</p> <p>Introduction: Importance and Concepts of quality , quality assurance, International and Indian quality organizations, Quality System, Need for ISO 9000 and Other Quality systems and 7 QC tools.</p>	5	10
UNIT-II	Conventional Lathe & Milling machine.	<p>After completion of course Student should be able to:</p> <ul style="list-style-type: none"> • Lathe • Milling • Different Operation 	Describe about the different part of milling & turning & Working principle. Different operation of machine. Use of different cutting tools	10	20

UNIT-III	Grinding & Drilling	After completion of course Student should be able to: <ul style="list-style-type: none"> Grinding Drilling Different Operation 	Describe about the different part of Grinding & Drilling & Working principle. Different operation of machine. Use of different cutting tools.	10	20
UNIT-IV	Introduction to material	After completion of course Student should be able to: <ul style="list-style-type: none"> engineering material 	Engineering Material ,Need & Importance of material	5	5
UNIT-V	Properties & Classification of materials:	After completion of course Student should be able to: <ul style="list-style-type: none"> Describe about various Properties of material Describe About Mechanical Properties Classification of materials 	Mechanical, Electrical, magnetic, Chemical, Optical, Physical Strength, Elasticity,Plasticity,Stiffness,Resilience,Toughness,Ductility,Malleability,Hardness, Brittleness, Creep and Fatigue. Type of material such as metals, nonmetals, ceramics, polymers, composite materials	10	15
UNIT-VI	Metal and nonmetal	After completion of course Student should be able to: <ul style="list-style-type: none"> Difference between metal and nonmetal Types of metal Types of metal Alloy 	Describe Metals: ferrous & nonferrous. Explain ferrous materials: Contain Iron as base. Describe Ferrous Metals & their alloys extensively used in Metallurgical and mechanical. Industries for shaping the products. Nonferrous materials: Aluminum , Copper, Lead, Zinc, Tin , Nickel, Magnesium Write the factors consider in selection of material. Compare ferrous material with non-ferrous material. Identify the type of material (ferrous or non-ferrous)	10	20
UNIT-VII	Iron ,Steel, Heat Treatment Process	After completion of course Student should be able to: <ul style="list-style-type: none"> Types and use of iron and steel Iron and steel making process Heat treatment 	Describe the use of iron: Pig Iron , wrought iron , cast iron Describe the use of Steel: low carbon, high carbon, medium carbon, Alloy Steel. Describe the steel making process & iron carbon diagram. Describe the purpose of heat treatment of steel Explain the different heat treatment process such as Annealing, Stress relieving, Refining, Normalizing, Tempering and Hardening	10	10

COURSES / MODULE TEMPLATE

NOS /Module: Read, Interpret and Create Part Drawing using Auto-CAD

NOS /Module Code: MSME/ADCNC/02

Outcomes:

After completion of course Student should be able to

- Explain the application of engineering drawing.
- Construct orthographic Projections giving proper dimensioning with title block using appropriate line type and scale for any geometrical figure in Auto CAD
- Explain various drawing Equipment's.
- Understand of Engineering Dimensioning method and their application
- Distinguish between Isometric view and Isometric projections.
- Explain about GD&T
- Create 2D geometric sketches by using Auto CAD Software
- Develop 3D modeling by using advanced command
- Understand design generative & interactive drafting

THEORY HOURS: -30

PRACTICAL HOURS: 60

THEORY MARKS: -

PRACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	PR Marks
Unit-I	Introduction to auto cad	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • Understand CAD/CAM/CAE software. • Capability of Auto CAD • Use of various Visualization command • Documentation Quick tour • Create and Access documentation • Layout and plotting • Understand concept of hardware & software. 	Capability of Auto Cad, Starting AUTOCAD ,Various Visualization commands, Documentation Quick tour, Creating and Accessing documentation, Layout and plotting, Concept of hardware & software, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. Different Types of cad software. Also comparison of various CAD Software. CAD software features. Concept of hardware & software.	5	20
Unit-II	Editing methods and controlling drawing display	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • AUTOCAD & interface • Setting new drawing. • Accessing command • Opening & saving existing file & function keys etc. • Work with Co-ordinates system and their type • Drawing Line, curve objects (Circle, Arc, Ellipse, elliptical arcs,) • Create solid filled areas- Regions, Hatch, Dot-nut, DD type 	Create the replica of model using copy, array, Work with models in the modify toolbar, Work with Erase, Trim, Break, Break at point, Create mirror, fillet & chamfer, Execute dimensions through dimension style option Understand of design intent & edit the design intent, Identify Sketch Entities line arc, rectangle, circle etc., Use sketch settings, Use of Style toolbar (text style, Multilayer style etc.),Concept of creating single entity object, Perform Revision cloud and wipe out command	10	20
Unit-III	Layer management	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • Edit objects using the object property tool bar and various method • Adjusting snap & Grid alignment using Ortho mode • Use object snap and object tracking methods. • Understand the concept and use of layers 	Edit objects using the object property tool bar and various method, Concepts of layers, Create the layers by various line property., Extract the layers from the saved file by design Centre option, Application of layers on/off, Use of layers for block, text, dimension, freeze, lock. Work with snap & Grid alignment using Ortho modes, Define Attributes for variable text of block, Use of purge to eliminate the unused layers, blocks, Create title block using table option.	10	10

		<ul style="list-style-type: none"> Work with Layer 			
Unit-IV	Basic Dimensioning, Geometric dimensioning & Tolerance.	<p>At the end of this Unit the student should be able to:</p> <ul style="list-style-type: none"> Need for Dimension Detailed discussion on Dimensioning and tolerance method in AUTOCAD Edit method Add text with various engineering symbols Concept of block, formation of block, Attribute definition DD attribute and edit block Insert, Modify, renaming block 	Use of linear dimensioning (Linear, Align, Ordinates), Use of circular dimensioning (Radius, Diameter, Arc length), Create Baseline dimension & continuous dimensions for linear & angular dimension. Identify the appropriate Tool to create and modify the model, Add text with various engineering symbols, Deform the object by scale, lengthen, stretching, extend, Change the orientation of the object by align, offset, rotate, Concept of standard dimension, Use of angular dimension, Use of leader with text, block reference, concepts of Block, create the Block, Write block & extract the block from saved block.	10	10
Unit V	Getting started with 3d & Working in 3d space"	<p>At the end of this Unit the student should be able to:</p> <ul style="list-style-type: none"> Concept of Isometric Drawing, axes and planes Defining the paper setting View ports Overview of 3D model Solid modeling in AutoCAD Surface modeling in AutoCAD 	Concept of Isometric Drawing, axes and planes, so-circle, Defining the paper setting ,Overview of 3D model, Solid modeling in AutoCAD(creating technique),Solid modeling in AutoCAD(editing and modification technique),Solid modeling in AutoCAD(editing and modification technique),Review of previous Class, Surface modeling in AutoCAD(creating, editing and modification technique),Converting wire frame models in to surface mode	10	10
Unit VI	Introduction to engineering drawing & drawing instruments	<p>After completion of unit Student should be able to</p> <ul style="list-style-type: none"> Explain applications and advantages of Engineering Drawing Understand and explain difference between Drawing and Engineering Drawing Demonstrate and explain various Drawing instruments Calculate Representative Understand and demonstrate method of dimensioning 	Introduction and importance of engineering drawing, difference between Drawing and Technical drawing, Drawing Instruments - their Standard and uses, types of pencils used in technical Drawing, Lines, Drawing of Geometrical Figures, Lettering and Numbering, Dimensioning , Free hand drawing, sizes and Layout of Drawing Sheets, Method of presentation, Symbolic Representation.	5	5
Unit VII	Projections and plane:	<p>After completion of unit Student should be able to</p> <ul style="list-style-type: none"> Understand and explain the concept and importance of Plane and projection Understand between first and third angle of projection Use appropriate symbol in engineering drawing 	Introduction to projections and planes, types of projection, difference between first angle projection and third angle of projections, types of plane, symbols used in angle of projection, practical examples on plane and projections.	5	5

Unit VIII	Orthographic projections:	After completion of unit Student should be able to <ul style="list-style-type: none"> • Draw geometrical figures • Read and understand engineering drawing of any components / Parts • Identifies the drawing with different angle of projection with respect to different views 	Introduction to orthographic Projection, Construction of Geometrical Figures, Drawing of Solid figures, Drawing of Orthographic projection of blocks, Orthographic Drawing of simple fastener, practical examples of different component drawing in different angles of projection, drawing the projection of Points, line and solids in different views	10	10
Unit IX	Units & dimensioning.	After completion of unit Student should be able to <ul style="list-style-type: none"> • Understand and use of dimensioning systems • Understand the conversion of units in different standards • Understand and application of limit, fit and tolerances. 	Introduction to units, Dimension and tolerance, Limit, Fit, types of fit, geometrical tolerance symbols and characteristics, surface texture symbols, Surface texture value & location	5	10

NOS /Module: Create, Generate and Execute CNC Program for Manufacturing Process

NOS /Module Code: MSME/ADCNC/03

Outcomes:

After completion of course Student should be able to:

- Explain applications and advantages of CNC machines
- Demonstrate and explain various CNC control , calculate technological data for CNC machining
- Prepare and understand line program for various profile
- Prepare programs , demonstrate , simulate and operate CNC machines for various machining operations
- Perform basic maintenance activity on daily basis and prepare record of Machine break down
- Manufacturing the parts by using DNC in CNC machine.

Theory Hours: 30

Practical Hours: 270

OJT Hours: 60

Theory Marks : -

Viva Marks: - 100

Practical Marks: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	PR hours	Viva Marks	PR Marks
UNIT-I	Introduction to CNC technology and Use of CNC Milling Simulation Lab	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • Generate the program of different milling operation. • Use simulator for all this operation and ensure the tool path by simulation. 	Introduction Of CNC Milling Machine, Advantage & Disadvantage , G & M-Codes For CNC Milling, Part Programming Fundamentals, Functional Keys & Steps To Write A Program, Contouring, Used Of Compensation, How To Prepare A Program, Chamfer, Circular Movement, Label Setting, Pocketing (Rectangular & Circular) ,Polar Movement, Peck Drilling, Mirror Cycle, Datum Shift.	3	15	10	10
UNIT-II	CNC Turning Simulation Lab	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • Generate the program of different turning operation. • Also simulation of all this operation. Examination on practical. 	Introduction of CNC lathe machine, advantage & disadvantage, g & m-codes for CNC lathe, homing process, rough turning cycle, facing, chamfer, circular movement, grooving, peck drilling, threading (internal & external), boring, CD,	3	15	10	10

			subprogram. Examination on theory.. Machining of programmed exercise on CNC lathe machines.				
UNIT-III	CNC Machining-Milling (Operation and Setup)	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • CNC Mill History • Different CNC Milling Operation. 	History, What Is CNC Machine, It's Advantages & Disadvantages, Parts Of CNC Machine, Cutting Tools, Controllers, Languages, Co-Ordinate System, Codes With Description, Axes Of CNC Milling , Machine's Origin Position, Work piece's Origins Position, Homing, Programming Procedure, Hands On Practice On CNC Panel Board, Zigzag Facing ,Contouring ,Pocketing ,Peck Drilling In Cartesian Co-Ordinate, Peck Drilling In Polar Co-Ordinate ,Milling With All Operation ,Slot Milling In Polar Co-Ordinates ,Datum Shift & Rotation. <ul style="list-style-type: none"> • Practices on axis homing. Datum setting and tool offsetting. Zigzag facing operation, • Tool Radius Compensation contouring operation by single depth of cut, Circular contouring operation by single depth of cut. Practices on contouring operation by incremental depth loop. • Straight line and circular pocketing operation, tangential arc and polar contouring, drilling, polar drilling, boring, reaming. Practices on tapping operation. • Datum shift operation, rotation operation, multi tool operation by using ACT, • Combination of all operations i.e. contouring, pocketing, drilling, combination of all operations double side. : Practices On DNC and CAM Post Processer Setup and Data Transmission 	3	80	20	40
UNIT-IV	CNC Machining-Turning (Operation and Setup)	At the end of this Unit the student should be able to: <ul style="list-style-type: none"> • CNC Lathe History • Different CNC Turning Operation. 	Parts Of CNC Machine, Cutting Tools, Controllers , Languages, Co-Ordinate System, Codes With Description, Axes Of CNC Milling , Machine's Origin Position, Work piece's Origins Position, Homing, Programming Procedure , Hands On Practice On CNC Panel Board, Simple Rough Cutting Cycles, Complex Rough Cutting Cycles With Finishing Cycle , Peck Drilling Cycle ,Complex Rough Cutting Cycles For Boring With Finishing Cycle, Face Grooving Cycle , Surface Grooving Cycle , External Threading Cycle , External Threading Cycle With All Operations. Practice on panel board and axis homing. Job offset setting and Tool offsetting. Facing operation, Plane turning operation. Practice on Step Turning operation, Tapper Turning operation, Radius and Chamfer Turning operation, Drilling operation, Plane Boring operation. Practices On Plane Boring operation, Step Boring operation, Tapper Boring operation, Radius and Chamfer Boring operation, External Grooving operation, Practices On Internal Grooving operation, External Thread Cutting operation, Internal Thread Cutting operation, Combination of	3	80	20	40

			all internal & external operations. Practices On Combination of all external & internal double side operations,				
UNIT-V	Introduction To CAM software	At the end of this Unit the student should be able <ul style="list-style-type: none"> • Wireframe tool bar • Draw the 2D drawing. 	Introduction To Cam Technology & Benefits, Interface Of Master CAM, Used Of Toolbars, Functional Keys , Mouse Functions , Line , Rectangle , Rectangle Shape , Circle , Arc ,Fillet ,Fillet Chain, Chamfer , Chamfer Chain , Polygon , Ellipse , Translate , Mirror ,Rotate ,Trim , Spline	3	15	10	0
UNIT-VI	Use of Transform tools	At the end of this Unit the student should be able <ul style="list-style-type: none"> • Transform tool bar • Draw the 2D drawing. 	Explain about The Scale , Move To Origin , Offset ,Offset Contour ,Rectangular Array, Letter ,Point , Spiral , Helix, Break Two Pieces , Trim Many Joint Entity ,Close Arc, Break Manny Pieces , Simplify ,Break At Intersection , Break Circle ,Break Drafting Into Line , Convert To NURBS , Modify Spline, X Hatch , Dimension Tools , Dimension Option , Note , Introduction To Surface Modeling , 3d environment , Used Of 3d Tool Bar.	5	15	10	0
UNIT-VII	Use of Surface tools	At the end of this Unit the student should be able <ul style="list-style-type: none"> • Different surface modeling. • Surface modeling tool bar. 	Explain about The Draft , Extrude , Fillet , Trim , Ruled / Lofted , Revolved , Offset , Swept ,Net Surface , Fence ,Extend , Flat Boundary ,Fill Holes ,Remove Boundary , Split , untrimmed , 2 Surface Blend , 3 Surface Blend , 3fillet Blend , Project	5	15	10	0
UNIT-VIII	Use of 2D/3d tool path	At the end of this Unit the student should be able <ul style="list-style-type: none"> • Using 2D/3d tool path & generate. Programs... • Practically used the CNC. Examination on practical. 	Types Of Tool Path .Explain about the 2D tool path like contour, pocking, facing, and drilling. Explain about the surface rough (pocket , parallel , radial) surface finish (parallel , radial) ,flow line , contour , shallow , project , pencil ,how to generate programs & lathe tool path . Examination on theory. Step To Generate A Tool Path	5	15	10	0

COURSES / MODULE TEMPLATE

NOS /Module: Check and Inspect dimensions of machined Part using various Measuring instrument

NOS /Module Code: MSME/ADCNC/04

Outcomes:

After completion of course Student should be able to

- Understand End and line Standard
- Check linear measurements by using Vernier, Micrometer (Digital and Analog type)
- Check Linear Measurement by height gauges (Digital and Analog type).
- Check various geometrical parameters using measuring instruments
- Demonstrate angle and taper measurements by bevel protractor and Sine bar.
- Demonstrate screw thread and gear measurement.
- Use various advance instruments for linear, angular and profile measurement.
- Carry out surface roughness measurement using Surface roughness tester
- Used of Height Master, Profile Projector, Comparators, CMM.

THEORY HOURS: - PRACTICAL HOURS: 30 THEORY MARKS: - PRACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	PR Marks
UNIT-I	Introduction to basic Engineering Measurement & Metrology	After completion of unit Student should be able to <ul style="list-style-type: none"> • Describe and explain End and line standards. • Demonstrate the use of Slip gauges • Explain and demonstrate various gauges 	Define Metrology, Accuracy and Precision, End & line standards Desirable features of end standards, and use of slip gauge	6	20
UNIT-II	Measuring Instruments: Gauges & Comparators	After completion of unit Student should be able to <ul style="list-style-type: none"> • Explain and demonstrate various gauges • Understand and demonstrate comparators like multi angle, sigma comparators 	Gauges: GO- No GO type , Plug, Ring, tapper, thread, Snap, filler gauge etc., Comparators: Multi angle Sigma comparator, Back pressure and free flow type pneumatic comparators, Differential back pressure gauge.	6	20
UNIT-III	Measuring Instruments: Vernier , Micrometer and height Gauge	After completion of unit Student should be able to <ul style="list-style-type: none"> • Explain various measuring machines • Demonstrate and explain Optical dividing head • Analyze the co-ordinate systems and its applications 	vernier Caliper (Digital, Analog and Dial type), micrometer (Analog and Digital type), height gauges (Digital and Analog type), Dial indicator, calculation of least count for various instruments (Vernier Caliper, Micrometer and Height Gauge), inside micrometer, depth micrometer, bevel protractor and Sine bar, Optical Flat, Sprit level , Roughness tester and profile projector	12	40
UNIT-IV	Uses of Height Master, Profile Projector, CMM	After completion of unit Student should be able to <ul style="list-style-type: none"> • Use and woking of OPP and CMM 	<ul style="list-style-type: none"> • Use of height master and profile projector for the • Inspect the given job using CMM. 	6	20

COURSES / MODULE TEMPLATE

NOS /Module: Employability Skills

NOS /Module Code: MSME/ES/02

Module Hours: 60

Refer Standard Curriculum developed by NCVET _ Employability skills 60 Hrs