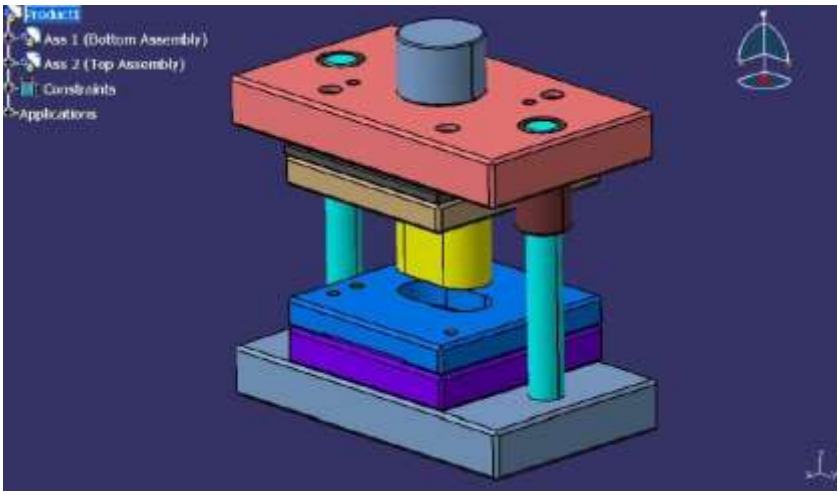
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
DEVELOPMENT COMMISSIONER
MINISTRY OF MICRO, SMALL & MEDIUM ENTERPRISES
MSME TECHNOLOGY CENTRE

MODEL CURRICULUM



Qualification Name:

JR. DESIGNER - TOOL

Qualification Code:

Version: 2.0

NSQF Level: 4.5

Model Curriculum Version: 2.0

Submitted By:

MSME TECHNOLOGY CENTRE

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NOS / MODULE TEMPLATE

NOS /Module: Create & Modify Part Model using CAD Software

NOS /Module Code: MSME/MCCTD/01

Outcomes:

After completion of course Student should be able to:

- Understand types of different CAD/CAM/CAE software.
- Create 2D geometric sketches by using Auto CAD/Collab CAD and Solid works a software.
- Develop 3D modeling by using advanced command.
- Clarify of Knowledge to the assembly constraint & develop different types of assembly design by using AutoCAD & Solid Work.
- 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 of CAD/CAM/CAE**	At the end of this Unit the student should be able to: • Understand CAD/CAM/CAE software. • Understand various feature in CAD software. • Understand various types of CAD software. • Understand Uses and Importance of CAD software in Industries. • Understand selection criteria of CAD software.	Capability of CAD Software and Introduction to AutoCAD, Collab, Solid Work. Description of the feature that have been added or changed since new Release CAD. Criteria for selection of CAD workstations, Shingle Design Process, 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	05
UNIT-II	**Introduction of Sketcher And Edit Command**	At the end of this Unit the student should be able to: • Understand drawing curve object. • Create various types of sketch geometry. • Understand editing property tools. • Understand controlling drawing display. • Understand geometric dimension & tolerance method	Drawing curve objects (Circle, Arc, Ellipse, elliptical arcs). Creating solid filled areas- Regions, Hatch, Dot-nut, DD type. Drawing line object like line, polyline, multiline etc. Drawing curve objects like Circle, Arc, Ellipse, elliptical arcs etc. Editing objects using the object property tool bar and various method & Controlling Drawing Display. (Carry, Lengthen, Stretching, Offset, Align, Trim, Extend, Array etc. Detailed discussion on Dimensions,	10	20

			Geometrical Dimension, Tolerance method in AUTOCAD.		
UNIT-III	**Part Design & Surface Modeling**	At the end of this Unit the student should be able to: • Working with block & defining block attributes. • Understand Concept of Isometric Drawing, Layout & Plotting. • Execute of solid modeling / 3d modelling. • Create surface modeling.	Working with block & defining block attributes. Concept of Isometric Drawing, Layout & Plotting. Creating of solid modeling / 3d modelling. Like creating, Editing, and modification technique. Creating of surface modeling like creating, Editing, and modification technique.	10	25
UNIT-IV	**Part Modeling & Assembly**	At the end of this Unit the student should be able to: • Understand Capability of Solid Work Software. • Understand Basic Part Modeling, Basic Modeling, Terminology, Choosing the Best Profile, Choosing the Sketch Plane, Details of the Part feature. • Understand concept of assembly constraint. • Clarify Different type of assembly.	Introduction & Capabilities of Solid Work. SolidWorks Basics and the User Interface What is the SolidWorks Software Design Intent File References Opening Files The SolidWorks User Interface. Basic Part Modeling, Basic Modeling, Terminology, Choosing the Best Profile, Choosing the Sketch Plane, Details of the Part Boss Feature, Patterning, revolving, shelling, ribs & editing features. Assembly- Bottom-Up Assembly, Creating a New Assembly.	15	25
UNIT-V	**Drafting**	At the end of this Unit the student should be able to: • Understand Bill of Materials. • Create Assembly Drawings. • Create & draw various drafting views. • Understand dimensions, annotations & various Engineering symbols.	Bill of Materials, Assembly Drawings, Drafting generate standard three views, model view, and predefined view, standard section views, crafting drawings, creating dimensions, annotations, notes and surface finish symbols, add geometric tolerance to the drawing views, add center marks and center lines to the drawing views, add center marks and center lines to the drawing views	20	25

COURSES / MODULE TEMPLATE

NOS /Module: Create & Modify Part Model and Generate Part Program Using CAD/ CAM Software

NOS /Module Code: MSME/MCCTD/02

Outcomes:

- After completion of course Student should be able to
- Understand advance Computer aided design software (UNIGRAPHICS CAD & UNIGRAPHICS CAM) as compare to other CAD software.
- Create 2D geometric sketches by using UNIGRAPHICS CAD & UNIGRAPHICS CAM software.
- Develop 3D solid & surface modeling by using advanced command.
- Understand assembly constraint & develop different types of assembly design.
- Understand design generative & interactive drafting.
- Apply knowledge in create complicated modeling & creative/innovative solution.
- Understand Post processing.
- Execute & generate various Milling, Lathe, EDM operations.
- Generate CNC program

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 Unigraphics CAD & Unigraphics CAM**	At the end of this Unit the student should be able to: • Understand advance computer aided design. • Understand Different types CAD s • Understand advanced features added & changed since new release software. • Analyze difference between various software as compare to UNIGRAPHICS CAD & UNIGRAPHICS CAM. • Execute the concept of hardware & software.	Capability of CAD Software and Introduction to UNIGRAPHICS CAD & UNIGRAPHICS CAM. Description of the feature that have been added or changed since new Release software. Criteria for selection of CAD workstations, Shingle Design Process, 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.	05	05
UNIT-II	**Unigraphics Sketcher & Solid Modeling**	At the end of this Unit the student should be able to: • Have fundamental knowledge of UG-CAD software. • Create complicated geometry sketch • Understand Adding Geometric & Dimensional Constraint to sketches.	Introduction of Unigraphics-CAD. History of cad & UG. Technical terms related to UG-CAD. Drawing sketches for solid models. Creating sketches in the Sketch task environment & Modeling Environment. Understand Various Sketching Tool. Editing, Extruding, Revolving sketches. Adding Geometric & Dimensional	05	15

		• Perform Drawing sketches for solid models. • Understand various sketching tools. • Understand & Create sketches in the Sketch task environment & Modeling Environment.	Constraint to sketches.		
UNIT-III	**Advance Solid Modeling**	At the end of this Unit the student should be able to: • Understand Working with Datum plane, Coordinate System, and datum axes. • Understand Advance Modelling Tool. • Apply advance editing, modifying, creating feature. • To execute Boolean, extrusion termination operations. • Create 3D model design.	Working with Datum plane, Coordinate System, and datum axes. Specifying Boolean operation, Specification other Extrusion Termination option. Advance Modelling Tool like creating various types of Hole, Grooves, Slots, Chamfer, and Edge Blend. Pattern Feature Tool, Mirror Feature Tool, and Sweeping Sketches along guide curve. Creating swept, Tubes or cables, Threads, Shell Features.	15	20
UNIT-IV	**Assembly Design & Surface Modeling & Drafting**	At the end of this Unit the student should be able to: • Understand surface modeling concept. • Create surface model. • Understand concept of assembly constraint. • Understand concept of Drafting. • Understand different types of view. • Use different engineering symbols	Various Assembly constraints. Working with bottom up and top down assembly. Design in context. Generating bill of material. Tool Develop & design in UG-CAD. Surface Modelling Feature, Family table. Generating, Editing, and Dimensioning the Drawing views. Types of Drawing View, Modifying the properties of Generated drawing view, printing tools, print, plot.	15	20
UNIT-V	**Tool Path Generation**	At the end of this Unit the student should be able to: • Understand capabilities of UG CAM. • Understand CAM concept, Master Model concept. • Understand Manufacturing application.	Introduction to Unigraphics CAM environment. Review of Modelling. Introduction to CAM concept, Master model concept. Machining environment, Operation Navigator. Re-entering into the Manufacturing application. Manufacturing Tools, Creating new operation. Manufacturing applications, Saving part file, closing part file.	10	20

UNIT-VI	**CAM Program Generation**	At the end of this Unit the student should be able to: Understand Various Milling and Lathe operations by using Unigraphics CAM. • Execute various drilling, reaming operation & hole making etc. • Understand various boundary setting. • Execute all milling & lathe operation by using UG CAM. • Understand Wire EDM, EDM operation. • Understand generate Wire EDM Operation.	Various Milling and Lathe operations by using Unigraphics CAM. Point to point machining. Creating drilling & reaming operation and hole making. Planner mill overview Profiling, Single level, Multi-level. Multi region, Creation of Boundaries. Setting Custom Boundary Member Data Setting Drive Cutting Method, Ramping method. Cut types, Trim boundary, and Uncut Region boundary. Creating Cavity Milling operation. Blank Geometry and offset, uses of cutting option. Creating fixed contour operation. Lathe cross section, common turning parameters. Rough & Finish turning, what is wire EDM, EDM dialog overview? Wire EDM operation, creating Wire EDM Operation. Internal & External Trim operation	10	20

COURSES / MODULE TEMPLATE

NOS /Module: Design of Jigs & Fixtures

NOS /Module Code: MSME/MCCTD/03

Outcomes:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Jigs, fixtures and Gauges
- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hours	TH Marks	PR Hours	PR Marks

UNIT-I	**Introduction to Jigs & Fixture and Locators Design**	At the end of this unit student should be able to: • Describe and classify locating elements • Explain locating principle and methods • Select locating devices • Use standard parts	Locating Elements: Introduction, Jigs (Production Devices), Locating Principle, Locating methods and devices, Standard parts and their selection	04	10	05	10
UNIT-II	**Clamping Devices**	At the end of this unit student should be able to: • Describe and classify devices • Explain working of Pneumatics and hydraulic actuation clamping • Determine clamping force • Interpret tolerance in design • Analyze error	Clamping Devices: Introduction, Pneumatics and hydraulic actuation clamping, Analysis of clamping force, Tolerance and error analysis	08	30	05	30
UNIT-III	**Design of Jigs**	At the end of this unit student should be able to: • Understand deign of jigs • Design procedure for different jigs • Select material in Jig design • Determine economic justification of use of jigs and fixture	Design of Jigs: Introduction, drill bushes, elements of jig, construction, material for jig elements, different types of jigs-plate jig, table jig, box jig, indexing device, multi station jig.	08	30	10	30

UNIT-IV	**Design of fixtures**	At the end of this unit student should be able to: • Understand deign of fixture • Design procedure for different fixture • Select material in fixture design • Maintenance of Fixture • Use of CAD/CAM in Jigs and Fixture Design	Design of fixtures: Introduction, Design principles of fixtures, types of fixture, general principles of boring fixtures, classification of boring fixture, lathe fixture, , Milling fixture, Inspection Fixture.	10	30	10	30

COURSES / MODULE TEMPLATE

NOS /Module: Design of Press Tools

NOS /Module Code: MSME/MCCTD/04

Outcomes:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Press Tools

- Design against standard and parameters
- Apply design principles to specific problem
- Interpret of output and confirming to specifications
- Collecting data related to design and manufacturing
- Communicate with manufacturing line

THEORY HOURS: -30 PRACTICAL HOURS: 60 THEORY MARKS: -100 RACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hours	TH Marks	PR Hours	PR Marks
UNIT-I	**Introduction to Press Tools & Types of Press**	At the end of this unit student should be able to: • Understand and classify Press machines • Describe the characteristics of press machines • Explain the principle of stretch forming machine • Understand feeding and unloading equipment • Have fundamental knowledge of Design principles of presses	Classification of Mechanical, Hydraulic, and pneumatic presses, Press Characteristics, safety devices in presses. Principles of stretch forming machines, principles of feeding and unloading equipment	04	10	08	10
UNIT-II	**Design of Dies**	At the end of this unit student should be able to: • Explain shearing theory • Explain tooling • List different type of tools • Perform mathematical calculations for designing • Will be able to calculate best economy for production.	Design of Dies: Introduction terminology shearing dies-types of dies – analysis process shearing clearance – size and tolerances of die opening and punch – force, power, energy in shearing – loading center, shearing with inclined edges – strip layouts, economical stock – Utilization.	08	30	16	30
UNIT-III	**Elements of shearing dies**	At the end of this unit student should be able to • Describe and select elements of press tool • Perform Design calculation for elements • Apply alignment system design for press tool	Elements of shearing dies – die plates – split dies, rules of development for split dies, inserts, types of punches, punch holders, punches – strippers – calculation of springs and rubber ejector, shedders, stops – pilots – stock guides – alignment system design for press tools.	08	30	16	30

UNIT-IV	**Tool Design**	At the end of this unit student should be able to • Explain compound and progressive dies • Design Compound and progressive tool	Simple Piercing tool, Blanking Tool, Compound dies, progressive dies.	10	30	20	30

COURSES / MODULE TEMPLATE

NOS /Module: DESIGN OF MOULD

NOS /Module Code: MSME/MCCTD/05

Outcomes:

After completion of course Student should be able to

- Understand clearly the tool design parameters of Moulds.
- Design against standard and parameters.
- Apply design principles to specific problem.
- Interpret of output and confirming to specifications.
- Collecting data related to design and manufacturing.
- Communicate with manufacturing line.

THEORY HOURS: -30 PRACTICAL HOURS: 60 THEORY MARKS: -100 RACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hours	TH Marks	PR Hours	PR Marks
UNIT-I	**Introduction to Mould & Basic terminology in moulds**	At the end of this unit student should be able to: • Describe terminology in moulds • Understand different types moulds • List elements of moulds • Describe the functions of element / component of tools	Basic terminology in moulds, Mould cavities and cores, Bolters, Ancillary items, Attachment of mould to platen, Basic Terminology injection, ejector plate assembly, ejection techniques, ejection from fixed half, sprue pullers, feed system – runner, gates	04	10	08	10
UNIT-II	**Types of Moulds**	At the end of this unit student should be able to: • To select standard moulds system • To Clarify select best option among various option available • To explain significance of	Parting surface –general, flat parting surface, non-flat parting surface, venting. Mould cooling – general, cooling insert-type mould plates, Standard mold system – general considerations, standard two-parts mould systems, deviations from the	08	30	16	30

		parting surface • Study/Analyses problem faced in designing & manufacturing tool	standard mould.				
UNIT-III	**Types of Dies**	At the end of this unit student should be able to: • To select split moulds • To use standard parts for split moulds • Understand side cores and cavities • Design moulding with undercuts • To identify and apply various design features	Splits – general, sliding splits, angled-lift splits, standard parts for the splits type mould. Side cores and cavities – general design features, types of side core and side cavity, standard mould parts. Moulding internal undercuts – general, from pin, split cores, side cores.	08	30	16	30
UNIT-IV	**Tool Design**	At the end of this unit student should be able to: • Understand customer requirement and component specification • To draw the conceptual drawing for appropriate mould • Perform design calculation for tooling • To select different standard element. • To draw final tool design. • Evaluate design against standard • Prepare bill of material	Procedure for designing an injection mould – general, primary positioning of inserts, ejector system, complete the top half the drawing, complete the plan view, complete the cross-section, complete drawing and checking mould drawings	10	30	20	30

COURSES / MODULE TEMPLATE

NOS /Module: Employability Skills

NOS /Module Code: MSME/ES/01

THEORY HOURS: 60 PRACTICAL HOURS: - THEORY MARKS: 100 PRACTICAL MARKS: -

Refer Standard Curriculum developed by NCVET. (https://nqr.gov.in/downloads/pdfs/60-hours_MC_Employability_Skills.pdf)