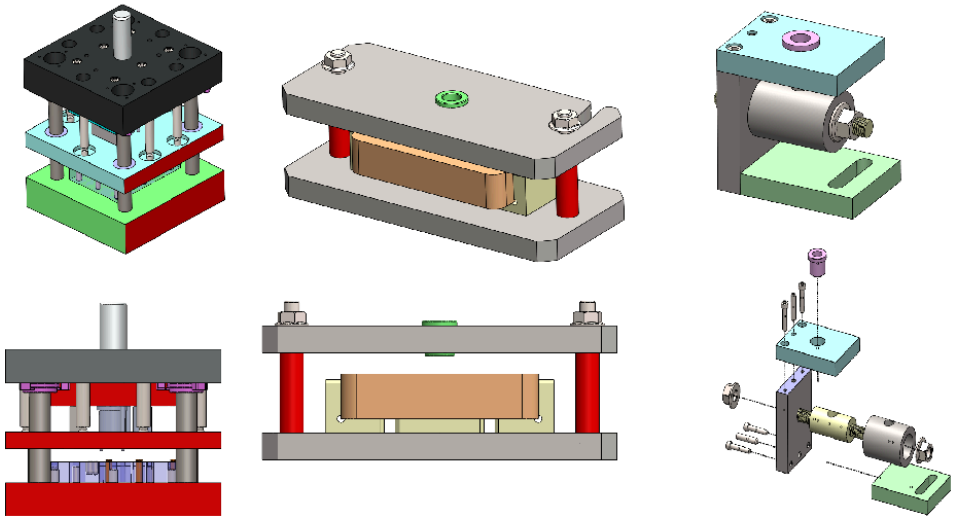
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
DEVELOPMENT COMMISSIONER
MINISTRY OF MICRO, SMALL & MEDIUM ENTERPRISES

MSME TECHNOLOGY CENTRE

MODEL CURRICULUM



Qualification Name:

Technician- Tool and Die

Qualification Code:

Version: 1.0

NCrF/NSQF Level: 4.5

Model Curriculum Version: 1.0

Submitted By:

MSME TECHNOLOGY CENTRE

O/o DC MSME, Ministry of Micro, Small and Medium Enterprises

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NOS / MODULE TEMPLATE

NOS /Module: TOOL DESIGN- PRESS TOOL

NOS /Module Code: MSME/DTE/17

Outcomes:

After completion of course Student should be able to:

1. Understand different types of tool.
2. Understand press tool, types of press tool, operation of press tools.
3. Selection of proper tool as per the component given
4. Get knowledge about design of press tool and its parameter.
5. Understand different application of press tool and its need in industry.
6. Understanding the technological subjects and applying in the workshop practice.

Theory Hours: 20 **Practical Hours: 40** **Theory Marks: 100** **Practical Marks: 100**

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	PR hours	TH/PR Marks
UNIT-I	Introduction	• At the end of this unit Student should be able to understand about different types of tools used in industries. • Get knowledge about concept of press tool. • To know about the sheet metal and strip layout • Understand design fundamental of presses and advantages and disadvantages of press tool • Get knowledge about use of press tool. • Selection of proper tool parts as required. • Understand different operation done on press tool.	• Overview of mass production of sheet metal component for use of press tool, • Types of presses • To produce sheet metal component and application by use of press tool for mass production • Principles of press tool for sheet metal • Studying the use of sheet material components.	3	-	10/10
UNIT-II	Press tool operation	• At the end of this unit one should be able to • Understand requirement of press tool operation. • Understand different operations on press tools.	Press tool cutting operation • Understand use and application of cutting operation with press tool and classification of it	3	-	10

		• Get knowledge about strip layout, principles about operations, different sheet metals, and require parameter to band or cut it.	• Learning about the principle of shearing and clearance with strip layout. Study about relation between punch and die. • Types of cutting operation piercing, blanking cut off.			
UNIT-III	Basic element of press tool	• At the end of this unit Student should be able to • Understand the different component of press tools like cutting die, top plate , bottom plate, guide pillar , guide bush, stripper plate etc. • Understanding about the different component used in design of press tool.	• Understand application of different element in press tool. • Brief knowledge of press tool and their parts. • Principle of alignment and guidance, clearance, stripping and ejection, mounting	3	5	15
UNIT-IV	Classification of press tools	• At the end of this unit Student should be able to get knowledge about different material their uses for manufacturing of elements of press tool. • Get knowledge for manufacturing different process to produce elements. • Get knowledge about design of element and its requirement.	• Understanding about the applications of different element in press tool. • Brief knowledge of press tool and their parts. Cutting dies • Brief knowledge about types of cutting and classification like blanking die, piercing dies, and compound die • notching, turning, and shearing. • Principle of construction of cutting dies like integrated and section dies.	3	-	30
UNIT-V	Design parameter, Components& layouts	• At the end of this unit Student should be able to • Get knowledge about the design of press tool. • Get knowledge of different parameters required during design. • Selection of strip layout • Conceptual designing the model and other components of press tool. • Selection of different material for different element. • Selection of bending parameters and bending operation.	• Brief knowledge about various parameter of design like shearing, • strip layout, • elements of press tool for cutting operation bending, drawing and integrated operation with understanding of shearing angle , stripping force ,effect of shear angle, principle of shearing and stripping force, economy factor material utilization , classification of die set, shaft height, concept of material selection , bending force, spring back, guiding, locating , ejection, functional element etc.	3	5	
UNIT-VI	Conceptual design	• At the end of this unit Student should be able to understand conceptual design and its application	• Principle of conceptual design, developing alternatives, selecting optional design	2	-	
UNIT-VII	Design of press tools	• At the end of this unit Student should be able to get knowledge about the design of press tool. • Get knowledge of deferent require parameter during design. • How to create perfect design of press tool.	• Brief knowledge about various parameter of design like shearing, strip layout, • Elements of press tool for cutting operation bending drawing and integrated operation with understanding of shearing angle, stripping force, effect of shear angle, • principle of shearing and stripping force, economy factor material utilization,	-	30	

		• Selection of different material for different element.	• Classification of die set, shaft height, concept of material selection, bending force, spring back, guiding, locating, ejection, functional element.			
UNIT-VIII	Classification of press	• At the end of this unit Student should be able to Understand different types of presses. • Get knowledge about parameter to use different press for different press tool operation. • Understand selection of press for operation. • Get knowledge for selection of press by its height, power etc.	• Understand concept of shut height, die cushion and presses • Principles of presses • Construction of press • Selection of shut height and selection of presses.	3		

NOS /Module: TOOL DESIGN JIG, FIXTURE &GAUGES

NOS /Module Code: MSME/DTE/18

Outcomes:

After completion of course Student should be able to

1. Understand the fundamental concepts and terminology related to jigs, fixtures, and gauges.
2. Demonstrate the ability to design jigs and fixtures for specific machining and assembly operations.
3. Evaluate the selection criteria for appropriate materials and manufacturing processes in jig and fixture design.
4. Develop an understanding of the principles behind gauge design and measurement
5. Apply measurement techniques using different types of gauges with precision and accuracy.

THEORY HOURS: 20 PRACTICAL HOURS: - 40 THEORY MARKS: 100 PRACTICAL MARKS:100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	PR hours	Marks
Unit I	Introduction to Jigs, Fixtures, and Gauges	Understand the fundamental concepts and terminology related to jigs, fixtures, and gauges.	• Understanding the basicsImportance in manufacturing • Types and classifications • Terminology and symbols	2		10
Unit II	Principles of Jig and Fixture Design	Demonstrate the ability to design jigs and fixtures for specific machining and assembly operations.	• Design considerations • Material selection • Tolerance and fits • Clamping mechanisms • Locating and supporting elements	3		15
Unit III	Jig and Fixture Components	Tooling elements and accessories	• Fixture bases and bodies • Clamps and fasteners • Drill jigs, milling jigs, and inspection fixtures • Tooling elements and accessories	5	10	15
Unit IV	Gauges and Measurement	Develop an understanding of the principles behind gauge design and measurement	• Types of gauges (plug gauges, ring gauges, snap gauges, etc.) • Gauge design principles • Measurement techniques • Gauge calibration and maintenance	3		15

Unit V	Quality Control and Inspection	The role of jigs, fixtures, and gauges in quality control	• The role of jigs, fixtures, and gauges in quality control • Inspection methods and instruments • Statistical process control (SPC)	2		15
Unit VI	Design of Jig and Fixture, Cost Estimation	• Hands-on construction of jigs and fixtures • Gauge use in measurement tasks	• Hands-on construction of jigs and fixtures • Gauge use in measurement tasks • Project work applying concepts learned • Troubleshooting and problem-solving in real-world scenarios • Cost Estimation	-	30	25
Unit VII	Safety and Best Practices	• Safety guidelines in jig, fixture, and gauge use • Maintenance and care practices	• Safety guidelines in jig, fixture, and gauge use • Maintenance and care practices	5		5

NOS /Module: WORKSHOP PRACTICE-III

NOS /Module Code: MSME/DTE/19

Outcomes:

After completion of course Student should be able to

1. Get knowledge about practical work in workshop.
2. Get knowledge about different machine used in workshop like milling, turning, grinding, etc.
3. Find out different problems during manufacturing of different parts and using different machine.

THEORY HOURS: - PRACTICAL HOURS: 180 THEORY MARKS: NA PRACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	PR Marks
Unit-I	Workshop practice	At the end of this unit Student should be able to understand different types of machining process. • Understand different machines. • Making multifunctional tools integrating skills of • Bench work • Turning • Milling • Surface grinding • Cylindrical grinding	• Manufacturing of hand mould/ • Manufacturing of guide plate tool • Basic pneumatics and basic hydraulics/EDM/micron • Pantograph vertical grinder	180	100

NOS /Module: STRENGTH OF MATERIALS

NOS /Module Code: MSME/DTE/20

Outcomes:

After completion of course Student should be able to

1. Use the fundamental and principle of strength of material.
2. Application of strength of material in general engineering.
3. Understand and analyses problems encountered in core technology.

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Introduction	• At the end of this unit Student should be able to understand the objective of subject & application of this subject in the tool & die technology. • To review the previous knowledge Which is required for understanding the strength of material • Study the trigonometry relationships.	• Subjects objectives, contents of subject, application of subject in tool & die technology. • Force, work done, power, energy, area, volume, units, unit conversions, and trigonometry. • Use conversion of units, multiplying factors.	5	10

Unit II	Stresses & strains	• At the end of this unit Student should be able to understand the Concept of classification of load, stresses, strains, types of stress and strains. • Hooke's law, young modulus of elasticity, nominal stress, yield point, plastic stage. • Proof stress, working stress, factor of safety. • Bars of varying cross-section. • Related problems on shear stress and strain, modulus of elasticity and rigidity.	• Principle of elasticity, stresses, strains, types of stress and strains. • Hooke's law, young modulus of elasticity, nominal stress, yield point, plastic stage. • Stresses and strains, deformation of body due to load, relationship of stress and strain. • Concept of ultimate strength and breaking stress, percentage elongation. • Concept of shear stress, strain. • Modulus of rigidity, Poisson's ratio. • Relationship between modulus of elasticity and rigidity.	10	15
Unit III	Shear force and bending moment	• At the end of this unit Student should be able to understand the Shear force and bending moment	• Concept of beam, form of loading, end supports-roller, hinged and fixed. • Bending moment and shear force. • Related problem on bending moment and shear force diagram for cantilever beam • simple supported beams subjected to concentrated and uniformly distributed load (UDL).	8	12
Unit IV	Stresses in beam	• At the end of this unit Student should be able to understand Theory of simple bending • Moment of inertia and its application. • Application of moment of inertia, second moment of area of common geometrical sections.	• Principle of simple bending, bending stresses, moment of resistance, bending equation, bending stress diagram. • Principle of moment of inertia, second moment, parallel axis theorem, perpendicular axis theorem, modulus of section.	8	13

Unit V	Deflection	• At the end of this unit Student should be able to understand the relationship between slope, deflection and radius of curvature.	• Concept of slope and deflection, radius of curvature. • Methods on slope and deflection. • Principle of slope, deflection, relationship between slope, deflection & radius of curvature.	8	12
Unit VI	Column & strut	• At the end of this unit Student should be able to understand Euler formula. • Principle of column and strut, short and long column, effective length, slenderness ratio, buckling load, crushing load.	• Concept and classification of column and strut, short and long column, effective length, slenderness ratio, buckling load, crushing load. • Apply Euler theory of column. Rankin formula for solution of problems on column and strut.	6	8
Unit VII	Torsion	• At the end of this unit Student should be able to understand principle of torque and torsion, torsion equation, torsional rigidity, angle of twist, hollow and solid shaft. • Principle of torque, power transmitted, angular displacement, shaft size, shear stress.	• Torsion, Torsion equation and torsional rigidity Concept of torque and torsion, angle of twist, hollow and solid shaft. • Power, torque and size of shaft. • Concept of torque, power transmitted, angular displacement, shaft size, shear stress • Determine size of shaft, shear stress to solve related problems.	10	20
Unit VIII	Spring	• At the end of this unit Student should be able to understand the principle of leaf spring, deflection, stiffness, strain energy stored in leaf spring.	• Leaf spring and calculation of stresses. Concept of leaf spring, deflection, stiffness, strain energy stored in leaf spring. • Describe stresses in leaf spring, length of spring. • Apply formula for calculating deflection, strain energy stored in leaf spring.	5	10

NOS /Module: MATERIAL SCIENCE AND METALLURGY

NOS /Module Code: MSME/DTE/21

Outcomes:

After completion of course Student should be able to

1. Describe the basic concepts and principles of material science and metallurgy.
2. Analyze the atomic and crystalline structure of materials.
3. Understand the relationship between microstructure and mechanical properties.
4. Explain the behavior of materials under different loading conditions.
5. Describe various phase transformations and their impact on material properties.
6. Comprehend the properties and applications of common engineering materials.
7. Analyze the different methods of material characterization.
8. Discuss the principles of metallurgical processes and their applications.
9. Apply knowledge of material science and metallurgy to solve real-world engineering problems.

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Introduction to Material Science	• Describe the basic concepts and principles of material science and metallurgy.	• Overview of material science • Classification of materials • Crystal structure and defects • Bonding in materials	6	5
Unit II	Mechanical Properties	• Analyze the atomic and crystalline structure of materials. • Understand the relationship between microstructure and mechanical properties. • Explain the behavior of materials under different loading conditions	• Stress and strain • Elastic deformation and plastic deformation • Hardness, toughness, and strength • Creep and fatigue • Mechanical testing and analysis	10	15

Unit III	Phase Transformations	• Describe various phase transformations and their impact on material properties.	• Phase diagrams and phase equilibrium • Solidification and phase transformations • Diffusion and kinetics • Heat treatment of materials • Microstructure development	10	15
Unit IV	Materials and Their Applications	• Comprehend the properties and applications of common engineering materials	• Ferrous and non-ferrous materials • Polymers, ceramics, and composites • Properties and applications of common engineering materials • Material selection for engineering design •	8	15
Unit V	Material Characterization	• Analyze the different methods of material characterization.	• Optical microscopy • Electron microscopy • X-ray diffraction • Thermal analysis techniques • Spectroscopy techniques	8	10
Unit VI	Metallurgical Processes	• Discuss the principles of metallurgical processes and their applications. • Apply knowledge of material science and metallurgy to solve real-world engineering problems	• Extraction of metals from ores • Casting, forging, and machining processes • Welding and heat treatment • Surface treatment and coatings • Corrosion and its prevention	10	25
Unit VII	Applications and Projects	Demonstrate effective communication and teamwork skills in laboratory work and projects.	• Practical applications and case studies • Group projects related to material selection and analysis • Presentation of findings and solutions	8	5

NOS /Module: BASICS ELECTRICALS & ELECTRONICS

NOS /Module Code: MSME/DTE/22

Outcomes:

After completion of course Student should be able to

1. Understand the fundamental principles of electricity, including voltage, current, and resistance, and apply Ohm's law to solve basic electrical problems.
2. Analyze and design simple electrical circuits, including series and parallel circuits, using Kirchhoff's laws and voltage/current dividers.
3. Identify and work with essential electronic components, such as resistors, capacitors, and transistors.
4. Describe the difference between digital and analog electronics and apply basic logic gate concepts to digital circuits.
5. Analyze and work with AC circuits, including phasors, impedance, and resonance.
6. Understand the basics of three-phase systems and the function of transformers.
7. Demonstrate practical skills by building and testing simple electronic circuits and completing a basic electronics project.
8. Gain confidence in troubleshooting electrical and electronic circuits.
9. Be introduced to microcontrollers and basic programming concepts.

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Introduction to Electricals	• Understand the fundamental principles of electricity, including voltage, current, and resistance, and apply Ohm's law to solve basic electrical problems.	• Introduction to electricity • Electrical safety and precautions • Units and measurements in electricity • Basic electrical circuits • Ohm's law and its applications • Voltage, current, resistance, and power • Series and parallel circuits • Kirchhoff's laws	6	20

			• Voltage dividers and current dividers		
Unit II	Electronics Fundamentals	• Passive vs. active components • Resistors, capacitors, and inductors • Semiconductors and diodes • Transistors and their applications • Introduction to amplifiers • Introduction to digital electronics • Binary, octal, and hexadecimal number systems • Logic gates and truth tables	• Introduction to electronics • Passive vs. active components • Resistors, capacitors, and inductors • Semiconductors and diodes • Transistors and their applications • Introduction to amplifiers • Introduction to digital electronics • Binary, octal, and hexadecimal number systems • Logic gates and truth tables	6	25
Unit III	Electrical Circuits and Analysis	• AC vs. DC circuits • Alternating current fundamentals • Phasors and complex impedance • RC and RL circuits • AC power and power factor • Resonance in electrical circuits • Introduction to three-phase systems • Transformers and their applications • Troubleshooting electrical circuits	• AC vs. DC circuits • Alternating current fundamentals • Phasors and complex impedance • RC and RL circuits • AC power and power factor • Resonance in electrical circuits • Introduction to three-phase systems • Transformers and their applications • Troubleshooting electrical circuits	9	30
Unit IV	Electronics Applications and Projects	• Gain confidence in troubleshooting electrical and electronic circuits. • Be introduced to microcontrollers and basic programming concepts	• Basic electronic components and their symbols • Breadboarding and soldering techniques • Building and testing simple electronic circuits • Introduction to microcontrollers • Programming microcontrollers • Building a basic electronics project	9	25

NOS /Module: PROJECT WORK-TOOL & DIE MAKING(ELECTIVE)

NOS /Module Code: MSME/DTE/23

Outcomes:

After completion of course Student should be able to

1. Get knowledge about practical work in workshop.
2. Acquiring practical knowledge and hand skill in operating the types of machines used in workshop

THEORY HOURS: PRACTICAL HOURS: 90 THEORY MARKS: PRACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	Marks
Unit I	Project Work	Skill Development	• Assign a small project related to the course • Apply the skills learned during the internship to complete the project. • Regular check-ins with mentors and supervisors.	75	75
Unit II	Documentation and Presentation	Skill Development	• Learn how to document your work, create technical reports, and maintain records. • Prepare a final presentation on the project work.	10	25

Unit III	Conclusion and Evaluation	-	• Final evaluation of the internship program. • Feedback session with mentors and supervisors.	5	-

NOS /Module: COMPUTER AIDED DESIGN (ELECTIVE)

NOS /Module Code: MSME/DTE/23

Outcomes:

After completion of course Student should be able to

1. Use the fundamental features and precision drafting tools in AUTOCAD to develop accurate technical drawings
2. Present drawings in a detailed and visually impressive manner.
3. Customize the application to meet your specific design in AUTOCAD.
4. Interpret drawings, draw interferences and workout other technical details.

THEORY HOURS: PRACTICAL HOURS: 90 THEORY MARKS: PRACTICAL MARKS: -100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	hours	Marks
Unit I	Introduction	• At the end of this unit Student should be able to understand the functions in CAD section • Use of computer and CAD software in area of design and drawing	• Review of computer fundamentals, instructions with respect to computer labs, file handling in windows operating system. • Concept of conventional design process, computer operation and control, CAD software used in tool room	10	--
Unit II	Introduction of AutoCAD equipment	• At the end of this unit Student should be able to understand the procedure to be adopted for computer aided drawings	• Basic knowledge of 2D & 3D design & drawing view in Auto-CAD. • Generating new file or open, save or rename and Exit a file.	30	15

		• Describing the co-ordinate system. • Using the AutoCAD workspace and user interface. • Understand and reading of engineering drawing, industrial drawing, and technical terms used in drawing.	• Tools bar in AutoCAD, different command in AutoCAD, • Creating objects in AutoCAD • Tutorials in learning assistance, creating and editing objects • Using co-ordinate system to specify points, shifting and rotating co-ordinate system		
Unit III	Creation/editing of lines	• At the end of this unit Student should be able to use commands effectively. • Use advanced editing and construction techniques. • Can understand the 2D sketcher commands and how to utilize them. • Creation of2D sketches.	• Understanding various terminology in sketcher with mouse control, sketcher constrains to create geometric creation in sketcher like line, Extend to next, rectangle, hatch etc. • Generate fully defined sketch with the aid of various constrain, like connect, horizontal /vertical, Tangent, symmetric, collinear, symmetric axis, relationship etc.	20	15
Unit IV	Creation/editing of curves	• At the end of this unit Student should be able to use the commands effectively. • Can use advanced editing and construction techniques. • Understand the 2D sketcher commands and how to utilize them. • Creation of2D sketcher drafting.	• Understanding various terminology in sketcher with mouse control, sketcher constrains to create geometric creation in sketcher like curve, point, arc by centre point, arc by start centre end, arc by start centre angle, arc by start centre length, arc by start end angle, arc by start end direction, arc by start end radius, arc by centre start end, arc by centre start angle , arc by centre start length, arc by continuous, fillet, chamfer, circle by centre point, circle by 3 point, circle by radius, circle by 2 point, circle by 3 point, circle by tan radius, circle by tan, ellipse by centre, ellipse by axis end, elliptical arc..	15	20
Unit V	Creation/editing of subjects	• At the end of this unit Student should be able to use the commands effectively. • Use advanced editing and construction techniques followed in AutoCAD • Understanding the 2D sketcher commands and how to utilize them. • Creation of 2D sketches.	• Principle of orthographic views of objects: front, top, left side, right side views • Concept of drawing to scale, dimensioning and text, tolerance, to modify dimension and tolerance. • Generate fully defined sketch with the aid of various constrain, like connect, horizontal /vertical, Tangent, symmetric, collinear, symmetric axis, relationship etc.	15	50

NOS /Module: EMPLOYBILITY SKILL

NOS /Module Code: MSME/DTE/24

Outcomes:

After completion of course Student should be able to

1. Outline the importance of Employability Skills for the current job market and future of work
2. List different learning and employability related GOI and private portals and their usage
3. Research and prepare a note on different industries, trends, required skills and the available opportunities

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Communication Skills	After completing this unit, participants will be able to: • communicate effectively using verbal and nonverbal communication etiquette.	• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette • Write a brief note/paragraph on a familiar topic • Explain the importance of communication etiquette including active listening for effective communication • Role play a situation on how to work collaboratively with others in a team	45	75

Unit II	Diversity and Inclusion	After completing this unit, participants will be able to: • Exhibit how to behave, communicate, and conduct oneself appropriately with all genders and PwD	• Exhibit how to behave, communicate, and conduct oneself appropriately with all genders and PwD • Discuss the POSH Act and its significance	15	25

SEM-IV

NOS /Module: TOOL DESIGN- PLASTIC MOULD

NOS /Module Code: MSME/DTE/25

Outcomes:

After completion of course Student should be able to:

1. Understand different types of moulding methods.
2. Understand about different types of plastic moulding and machines of it.
3. Get knowledge about component of plastic mould.

Theory Hours: 20 **Practical Hours: 40** **Theory Marks: - 100** **Practical Marks: 100**

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	PR hours	TH/ PR Marks
UNIT-I	Introduction	At the end of this unit Student should be able to understand different types of plastic materials and its properties.	• Introduction basic knowledge of mass production of molded of plastic component, • Application of plastic,	5	-	10

		• Understand classification of plastic. • Get knowledge about concept of mould. • Application of mould. • Different types of injection moulding machine.	• Classification of plastic material • Application of molding machine and equipment, concept of mould material, • Application of mould.			
UNIT-II	Moulding operation &Moulding Parts	At the end of this unit Student should be able to understand different types of moulding machines and its parts. • Understanding parameter of moulding machine. • Understanding different types of moulding machine. • Understanding mould and material use in mould.	• Understanding the injection moulding • principle of injection moulding machine, • study of injection moulding machine parts like hopper, barrel, lead screw, heater, injection system. • Understanding and idea of the injection moulding machine process like pressure setting, shots setting and other function of moulding machine like clamping, feeding, heating, ejection. • Understanding of elements of injection moulding process, machine mould and material.	5	5	15
UNIT-III	Elements of mould and their function.	At the end of this unit Student should be able to understand different types of plastic mould. • Understand different component use in mould. • Get knowledge about different material use different component. • Understand function and application of different component of mould. • Understand cooling system in mould and its need in plastic mould.	• Identify and obtain the injection moulding elements and their function like core and cavity, classification of core. • Function of core, cavity, principle of core cavity, material used for core cavity. • Understanding the function of feeding system by classified feeding system like runner, sprue gate, gate etc, and their function and which material used for this system. • Establish and importance of cooling system. In detail like types of cooling system, baffle cooling system, angle hole cooling system, bubbler cooling system and their function. • Understanding of ejection system, various types of ejection system like pin ejection system, stripper ejection system, air ejection system, blade ejection system, D-shape ejection system and knowledge of understanding procedure of ejection system.	5	5	20
UNIT-IV	Classification of mould	At the end of this unit Student should be able to understand different types of mould. • Get knowledge about different parts of mould according to different types of mould.	• Brief classification of injection mould like introduction, concept of ejection and feed system (two plate mould, three plate mould, stripper plate mould, stack mould. • Understanding of parting surface like flat parting, non-flat parting surface, relief of parting surface.	5	-	15

		• Get knowledge about parting surface , relief of parting surface				
UNIT-V	Design parameter for mould material and machine	At the end of this unit Student should be able to understand design parameter which require for design of mould. • Drawing different design for different types of mould. • Get knowledge about selection of material for all parts. • Understand process of manufacturing of each parts. • Cost of manufacturing. • Perfect design of plastic mould.	• Understanding of design parameters like properties of plastic material, quality and quantity of plastic material • Describing the design parameters of mould	-	5	30
UNIT-VI	Design of moulds	At the end of this unit Student should be able to understand how to assemble the parts by detailed drawings for manufacturing of mould	• Concept of use of design data sheet. concept of drawing & layout for assembly & details • Drawing the mould layout, drawing norms & practices • Drawing assembly and detailed drawings of mould	-	20	50
UNIT-VII	Mould data	At the end of this unit Student should be able to understand the bill of material and its use Mould data in the production of component	• Principle of bill of material, selection of material, standard parts material for processing. • Concept of machine set-up, processing parameter		5	20

NOS /Module: TOOL DESIGN- PRESS TOOL (ADVANCED)

NOS /Module Code: MSME/DTE/26

Outcomes:

After completion of course Student should be able to:

1. Understand different types of tool.
2. Understand press tool, types of press tool, operation of press tools.
3. Selection of proper tool as per the component given
4. Get knowledge about design of press tool and its parameter.
5. Understand different application of press tool and its need in industry.
6. Understanding the technological subjects and applying in the workshop practice.

Theory Hours: 20 **Practical Hours: 40** **Theory Marks: - 100** **Practical Marks: 100**

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

UNIT-I	Press tool operation	• Understand different parameter for cutting and non-cutting operations. • Get knowledge about strip layout, principles about operations, different sheet metals, and require parameter to band or cut it.	Press tool non cutting operation • The basic information of press tool noncutting operation • plastic deformation and spring back, strip layout, principle of plastic deformation, principle of spring back • Types of noncutting operation. • Steps followed for the operations. • Press tool integrated operation • Getting knowledge about integrated operation of press tool • Principles and application of integrated operation • Relation between difference operations.	5	-	
UNIT-II	Classification of press tools	• At the end of this unit Student should be able to get knowledge about different material their uses for manufacturing of elements of press tool. • Get knowledge for manufacturing different process to produce elements. • Get knowledge about design of element and its requirement.	• Non cutting dies • Understand types of noncutting dies like bending dies, forming dies, drawing dies with principle of die cushion. • Steps followed for the manufacture of non-cutting dies.	5	-	
UNIT-III	Design parameter, Components& layouts	• At the end of this unit Student should be able to • Get knowledge about the design of press tool. • Get knowledge of different parameters required during design. • Selection of strip layout • Conceptual designing the model and other components of press tool. • Selection of different material for different element. • Selection of bending parameters and bending operation.	• Brief knowledge about various parameter of design like shearing, • strip layout, • elements of press tool for cutting operation bending, drawing and integrated operation with understanding of shearing angle , stripping force ,effect of shear angle, principle of shearing and stripping force, economy factor material utilization , classification of die set, shaft height, concept of material selection , bending force, spring back, guiding, locating , ejection, functional element etc.	5	10	
UNIT-IV	Conceptual design	• At the end of this unit Student should be able to	• Principle of conceptual design, developing alternatives, selecting optional design	2	-	

		understand conceptual design and its application				
UNIT-V	Design of press tools	• At the end of this unit Student should be able to get knowledge about the design of press tool. • Get knowledge of deferent require parameter during design. • How to create perfect design of press tool. • Selection of different material for different element.	• Brief knowledge about various parameter of design like shearing, strip layout, • Elements of press tool for cutting operation bending drawing and integrated operation with understanding of shearing angle, stripping force, effect of shear angle, • principle of shearing and stripping force, economy factor material utilization, • Classification of die set, shaft height, concept of material selection, bending force, spring back, guiding, locating, ejection, functional element.	3	30	

NOS /Module: WORKSHOP PRACTICE-IV

NOS /Module Code: MSME/DTE/27

Outcomes:

After completion of course Student should be able to

1. Get knowledge about practical work in workshop.
2. Get knowledge about different machine used in workshop like milling, turning, grinding, etc.
3. Find out different problems during manufacturing of different parts and using different machine.
4. manufacturing of jigs and fixture and its different parts

THEORY HOURS: - PRACTICAL HOURS: 210 THEORY MARKS: NA PRACTICAL MARKS: 100

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

Unit-I	Workshop	• At the end of this unit Student should be able to understand different types of machining process. • Understand different machines used for different parts	• Manufacturing of jigs and fixture • CNC milling programming and handling • CNC turning programming and handling • Wire cut CNC milling programming and handling the machine.	210	400

NOS /Module: ENVIRONMENTAL SCIENCE

NOS /Module Code: MSME/DTE/28

Outcomes:

After completion of course Student should be able to

1. Understand the scope and importance of Environmental Sciences.
2. Describe the structure and function of ecosystems and the importance of biodiversity.
3. Identify common sources and types of environmental pollution and their impacts
4. Understand the science behind climate change and its global impacts.
5. Examine sustainable resource management and conservation practices.
6. Explore the role of policies and regulations in environmental protection.
7. Analyze the relationship between human population growth and environmental issues.
8. Discuss strategies for biodiversity conservation and the importance of protected areas.
9. Recognize the significance of environmental education and public awareness.

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Understanding Environmental Sciences	• Understand the scope and importance of Environmental Sciences.	• Introduction to environmental science • The scientific method and its application in environmental research • Environmental ethics and sustainability	3	10
Unit II	Ecosystems and Biodiversity	• Describe the structure and function of ecosystems and the importance of biodiversity.	• Ecosystem components and ecological interactions • Biodiversity and its conservation • Case studies on ecosystem services	3	10
Unit III	Environmental Pollution	• Identify common sources and types of environmental pollution and their impacts.	• Air, water, and soil pollution • Pollutants and their effects on human health and ecosystems • Pollution control and regulations	3	10
Unit IV	Climate Change and Global Warming	• Understand the science behind climate change and its global impacts.	• Greenhouse effect and climate change • Impacts of climate change on ecosystems and society • Mitigation and adaptation strategies	3	10
Unit V	Resource Management and Conservation	• Examine sustainable resource management and conservation practices.	• Renewable and non-renewable resources • Sustainable resource management • Case studies on resource conservation	3	10
Unit VI	Environmental Policy and Regulations	• Explore the role of policies and regulations in environmental protection.	• Environmental laws and regulations • Role of government and international organizations • Environmental impact assessment	3	10
Unit VII	Human Population and Environmental Impact	• Analyze the relationship between human population growth and environmental issues.	• Population dynamics and growth • Overpopulation and its consequences • Family planning and population control	3	10
Unit VIII	Biodiversity Conservation	• Discuss strategies for biodiversity conservation and the importance of protected areas.	• Conservation biology principles • Role of national parks and reserves • Wildlife conservation case studies	3	10
Unit IX	Environmental Education and Awareness	• Recognize the significance of environmental education and public awareness.	• Environmental education and communication • Environmental advocacy and grassroots movements • Local community engagement	3	10
Unit X	Sustainable Practices and Future Challenges	• Reflect on sustainable living practices and emerging environmental challenges.	• Sustainable living and consumption • Emerging environmental challenges (e.g., emerging pollutants, invasive species) • Course recap and future prospects	3	10

NOS /Module: PRODUCTION, PLANNING AND CONTROL, ESTIMATION & COSTING

NOS /Module Code: MSME/DTE/29

Outcomes:

After completion of course Student should be able to

1. Understand Concepts, principles and procedure of production, planning and cost estimation.
2. To acquire in learning the process, planning, production control and elements of cost structure.

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

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

Unit I	Introduction	• At the end of this unit Student should be able to understand production and its methods • Productivity and its influence in industry.	• Concept of production system, inputs, manufacturing process, output • Job production, batch production and mass production • Concept of productivity, productivity improvement, factors influencing productivity.	5	10
Unit II	Production planning	• At the end of this unit Student should be able to understand stores and inventory control • Material planning • Process planning	• Concept of storing, centralize and decentralize store, economical order quantity, ABC analysis, inventory control with respect to cost reduction. • Concept of material planning, master schedule, bill of material. • concept of inventory.	10	20
Unit III	Production control	• At the end of this unit Student should be able to understand routing and scheduling phases of production control • Loading , dispatching and follow-up	• Concept of routing, scheduling, critical ratio scheduling, • Production control • concept of charts • Concept of loading, dispatching & follow up, job cards, progress card, auditing, value analysis.	10	25
Unit IV	Elements of cost	• At the end of this unit Student should be able to understand cost structure and break even analysis • Overhead and depreciation	• Concept of cost, fixed cost, variable cost, labour cost, material cost, prime cost, factory cost. • Concept of breakeven analysis, graphical representation. • Concept of overheads, sinking fund method, depreciation, straight line method.	15	20
Unit V	Cost estimation	• At the end of this unit Student should be able to understand components of job estimation • Estimating procedure and estimation of cost of component	• Concept of estimate and cost, pricing, profit and loss. • Proper selection of machines and other resources, cost comparison. • Concept of reading drawings, manufacturing procedure, time estimation. concept of material cost, overhead cost • Raw material estimation, overhead expenses.	10	15
Unit VI	Profit & budget	• At the end of this unit Student should be able to understand profit and loss and its importance	• Concept of profit and loss	10	10

NOS /Module: INDUSTRIAL ENGINEERING

NOS /Module Code: MSME/DTE/30

Outcomes:

After completion of course Student should be able to

1. Understand Concepts, principles and procedure of industrial engineering
2. To acquire in learning the process, planning, production control and elements of cost structure.

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Introduction	• At the end of this unit Student should be able to understand industrial engineering and its application	• Concept of industrial engineering, concept of system. • Concept of men, material & equipment, industrial engineering activities such as	2	5

			work study, plant layout & material handling and inventory control		
Unit II	Plant layout	• At the end of this unit Student should be able to understand the methods and procedure of plant layout	• Concept of plant, plant location, factors governing plant location, plant layout. • Classification of plant layout and concept of work station	3	10
Unit III	Productivity and work study	• At the end of this unit Student should be able to understand productivity and its influence • Method study and its application. • Work measurement and its application.	• Concept of productivity, factors affecting productivity, productivity measure • Concept of work study, method study, micro motion study, symbols. • Concept of flow process chart, simo chart, low diagram, string diagram, motion economy. • Concept of work study, work measurement, uses of time study, time study method, time study recording, methods of rating, allowances &standard data, work sampling	5	15
Unit IV	Value analysis	• At the end of this unit Student should be able to understand value analysis process and its application	• Concept of value engineering, function/utility, value and classification • Process, standardization	4	5
Unit V	Network analysis	• At the end of this unit Student should be able to understand network techniques of CPM & PERT	• Concept of network analysis, classification of network technique • Concept of CPM and PERT technique • Time estimation in CPM & PERT	5	15
Unit VI	Quality management	• At the end of this unit Student should be able to understand inspection and inspection department • ISO quality system • Total quality management	• Concept of inspection, classification of inspection, incoming inspection, in process inspection, finished goods inspection • Concept of quality control & quality assurance, quality system standards. • Concept of ISO 9000. • Quality system documentation structure. • Concept of terminology such as quality, quality policy, quality planning, quality management system and quality audit.	5	25

			• Concept of total quality management, tools for total quality control, total quality management structure.		
Unit VII	Facilities planning	• At the end of this unit Student should be able to understand the facilities of planning and its needs	• Concept and classification of layout • Conventional approach to layout problem	2	10
Unit VIII	Inventory control	• At the end of this unit Student should be able to understand what is inventory control, models and application and its need for inventory • Need of practice of inventory control	• Re-order level, economic order quality • Inventory carrying costing • Concept and classification of practice of inventory control.	2	10
Unit IX	Engineering Economics	• At the end of this unit Student should be able to understand need of engineering economics.	• Concept of engineering economics. • Different ways of comparison of alternatives.	2	5

NOS /Module: PROJECT WORK-TOOL & DIE MAKING(ELECTIVE)

NOS /Module Code: MSME/DTE/31

Outcomes:

After completion of course Student should be able to

1. Get knowledge about practical work in workshop.
2. Acquiring practical knowledge and hand skill in operating the types of machines used in workshop

THEORY HOURS: PRACTICAL HOURS: 90 THEORY MARKS: PRACTICAL MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	Marks
Unit I	Project Work	Skill Development	• Assign a small project related to the company's operations. • Apply the skills learned during the internship to complete the project. • Regular check-ins with mentors and supervisors.	75	75

Unit II	Documentation and Presentation	Skill Development	• Learn how to document your work, create technical reports, and maintain records. • Prepare a final presentation on the project work.	10	25
Unit III	Conclusion and Evaluation	-	• Final evaluation of the internship program. • Feedback session with mentors and supervisors.	5	-

NOS /Module: CNC TECHNOLOGY (ELECTIVE)

NOS /Module Code: MSME/DTE/31

Outcomes:

After completion of course Student should be able to

1. Understand manual turning and milling machine and automation in CNC and milling machine.
2. Understand and utilize codes and program.

THEORY HOURS: PRACTICAL HOURS: 90 THEORY MARKS: PRACTICAL MARKS: -100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Pr hours	Marks
Unit I	Introduction	• At the end of this unit Student should be able to understand CNC turning and milling machine. • Utilization of different G and M codes for different programs.	• Concept of NC, CNC, DNC machining • Advantages of CNC over conventional machining process. merits and demerits of CNC machining • Environmental control for CNC machine	5	5

Unit II	Classification of NC system	• At the end of this unit Student should be able to understand principle of feedback control • Classification based on control system feature • Classification based on co-ordinate system • Classification based on identification of axis	• Classification based on feedback control • Open loop control system, close loop control system • Feedback devices • Point to point control, straight line control, continuous control system • Absolute co-ordinate, incremental co-ordinate system • Linear axis rotary axis	5	10
Unit III	Fundamental of part programming	• At the end of this unit Student should be able to understand manual part programming • Computer aided part programming	• Concept of NC codes, programming format, G&M code, Point to point control, straight line, curved surface programming • Concept of NC programming on computer, concept of sub-routine , do-loops fixed/canned cycle	8	15
Unit IV	Tooling for CNC machine	• At the end of this unit Student should be able to understand tooling for CNC machine and application	• Concept of design features of cutting tools for CNC, auto tool changer	2	10
Unit V	Specification of CNC machine	• At the end of this unit Student should be able to understand specification of CNC machines and purpose	• Concept of co-ordinate, spindle rpm, linear and rotary axis of rotation. machine control system/unit of CNC , cooling system	5	10
Unit VI	CNC operation and machines	• At the end of this unit Student should be able to understand CNC lathe and turning operation • CNC milling and milling operation • CNC machining centre • CNC EDM- spark erosion • CNC EDM- wire cut • EDM process • Function of EDM cutting parameter operation • CNC grinding machine	• Introduction about turning operation, Understand turning operation Understand tool selection for different operation like(single point cutting tool, drilling tool ,threading tool, grooving tool, boring tool,), geometry of cutting tool (angle, cutting points etc.) • Understand G code and M code for turning • Introduction about milling operation (like facing, boring, drilling, reaming, pocket, slotting)., • Understand tool selection for different operation like (multi point cutting tool, drilling tool, boring tool, reaming tool,	15	50

			cutters), geometry of cutting tool (angle, cutting points etc.) • Understand G code and M code for milling • Understand in detail about • Concept of EDM, wire cut processes • Main part work holding device, tool holding devices, cutting tools, material • Designing parameters of tools for spark erosion and wire cut in CNC machining • Machine and work reference , selection of grinding wheel in CNC part programming		

NOS /Module: EMPLOYBILITY SKILL

NOS /Module Code: MSME/DTE/32

Outcomes:

After completion of course Student should be able to

1. Outline the importance of Employability Skills for the current job market and future of work
2. List different learning and employability related GOI and private portals and their usage
3. Research and prepare a note on different industries, trends, required skills and the available opportunities

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Financial and Legal Literacy	After completing this unit, participants will be able to: • Calculate income and expenditure for budgeting • Demonstrate how to conduct offline and online financial transactions, safely and	• Discuss various financial institutions, products, and services • Demonstrate how to conduct offline and online financial transactions, safely and securely and check passbook/statement	2	50

		securely and check passbook/statement	• Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deductions • Calculate income and expenditure for budgeting • Discuss the legal rights, laws, and aids		
Unit II	Essential Digital Skills	After completing this unit, participants will be able to: • operate digital devices and use the associated applications and features, safely and securely • Create an e-mail id and follow e- mail etiquette to exchange e -mails	• Describe the role of digital technology in day-to-day life and the workplace • Demonstrate how to operate digital devices and use the associated applications and features, safely and securely • Demonstrate how to connect devices securely to internet using different means • Follow the dos and don'ts of cyber security to protect against cyber crimes • Discuss the significance of displaying responsible online behavior while using various social media platforms • Create an e-mail id and follow e- mail etiquette to exchange e -mails • Show how to create documents, spreadsheets and presentations using appropriate applications • utilize virtual collaboration tools to work effectively	35	50