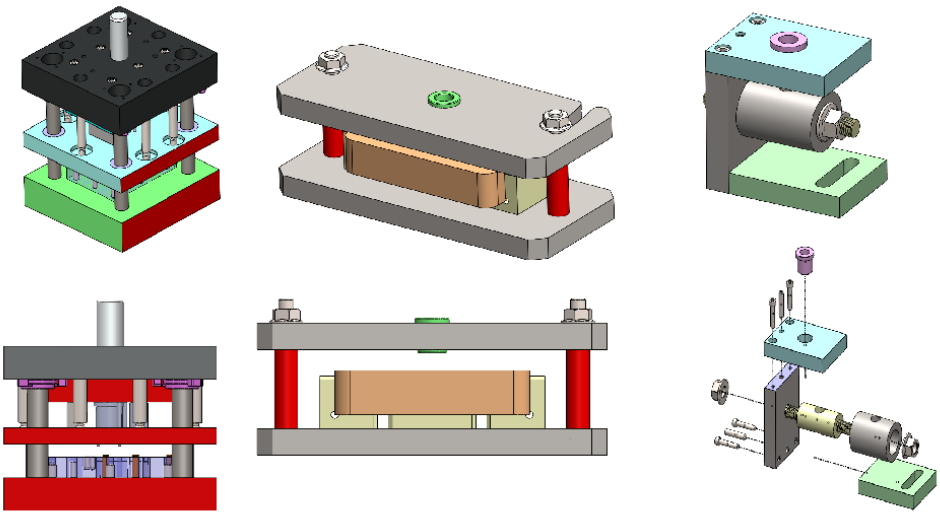
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
DEVELOPMENT COMMISSIONER
MINISTRY OF MICRO, SMALL & MEDIUM ENTERPRISES
MSME TECHNOLOGY CENTRE

MODEL CURRICULUM



Qualification Name:

Jr. Technician – Tool & Die

Qualification Code:

Version: 1.0

NCrF/NSQF Level: 3.5

Model Curriculum Version: 1.0

Submitted By:

MSME TECHNOLOGY CENTRE

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

Govt. of India

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NOS / MODULE TEMPLATE

SEM-I

NOS /Module: ENGINEERING DRAWING-1

NOS /Module Code: MSME/DTE/01

Outcomes:

After completion of course Student should be able to:

1. Use the fundamentals of drawing and understand the importance of Scale, lines and lettering.
2. Understanding how to read a drawing.
3. Understand different types of line geometric construction.
4. Understand different methods of orthographic projection and its importance in drawing.
5. Application of orthographic projection and isometric projection.

Theory Hours: **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	• Understand the scientific facts, concepts, principle and procedure of engineering drawing used in tool design, process planning and carrying out jobs in tool and die technology. • Understand the media used for engineering drawing.	• Introduction and observation of engineering drawing practice in the tool room environment and manufacturing industry. • Definition of sketch, mechanical and computer generated drawing. • Classification of drawing set and related information. • Industrial drafting process from product conception to production. • Red link diagram and subject objective. • Integrate the flow of engineering drawing tool room. • Select reference material and ISO norms. • Sketch flow chart of engineering drawing process of Tool Room. • Introduction to drawing instruments accessories and aids, concept of standard drawing sheet.	20	30
UNIT-II	Basics of drawing-Scale, lines and lettering	• At the end of this unit, student should be able to understand how to represent the drawing using the rules followed with the help of geometric dimensions and tolerances.	• Introduction to scale, line and lettering its classification. • Choice and use of BIS norms for scale, line and lettering. • Selecting of Various scales, line and lettering. • Introduction & Advance geometrical Construction	20	40

		• To scale, line and lettering drawing and practical in different lines and lettering. Drawing of different line and letters in drawing book. • Procedure for drawing, straight line, angles, polygons, circle, all drawing drawn in sketch book. • Drawing of object as per 1st & 3rd angle projection method, Procedure for drawing different view in 1st & 3rd angle. Procedure of indication of dimension	• Definition: Straight line angles, polygons, circle areas. • Conic Sections: Ellipse, Parabola, Hyperbola. • Other Curves: helix, cycloid, involutes. • Introduction to orthographic, • Different view and plane-identification. • Definition of plots, lines, planes, solids. • Principal of quadrants and panes. • Drawing of difference view of paints in 1st and 3rd angle projection • Introduction to dimension, • Definition: functional dimension, Non – functional dimension auxiliary dimension. • Rules of dimensioning. method of dimensioning, indication of dimension		
UNIT-III	Isometric view	• At the end of this unit Student should be able to understand how to project a drawing using the following projections: • Drawing projection of plane and point, • Drawing of isometric view of different object. • Conversion of Isometric view to orthographic projection.	• Introduction to Isometrics drawing definition of Isometric using the coordinate system. • Isometric projection of planes, prisms, pyramids, cylinders, cones, irregular object. • Dimensioning of Isometric drawing chain dimension parallel dimension Oblique dimension Align dimension, Drafting of object. • Isometric part drawing drafted in orthographic view as per 1st & 3rd angle projection method.	20	30

NOS /Module: WORKSHOP TECHNOLOGY-I

NOS /Module Code: MSME/DTE/02

Outcomes:

After completion of course Student should be able to

1. Use and application of different machine as per requirement
2. Understanding different types of machine and their operation and use of cutting fluid
3. Customize the use of different machine as per manufacturing of part
4. Calculation of speed, feed and depth of cut and its importance
5. Plan to design the tool and die parts
6. Understand the technology and apply them in the field of engineering.

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 to workshop technology and Safety precautions	• At the end of this unit Student should be able to understand tools and materials required and their use in industry • Type of Material-Ferrous & non-ferrous • SafetyApplication, safety rules, Precaution of accidents • Safety Precaution and safety rule	• Introduction about • Classification of industrial material • Processing Method • Industrial material • Major processing methods • Material processing Technique • Efficiency • Effectiveness • Use of Safety Precaution • Concept of accidents and Classification source of accident	15	25
UNIT-II	Basic metal working techniques	• At the end of this unit Student should be able to • Types of hand tools • Use & Application of hand tools. • Use & Application & use of Filing methods • Use & Application & use of chisel • Use & application of marking tool • Working principle of welding, soldering and brazing	• Understand various form selection of hand tool • Use of hand tool • Design of hand tool • Construction of hand tool • Description of hand tool • Types of files • Types of Chisel • Types of Marking tool • Classification of welding, soldering and brazing	20	35

UNIT-III	Drilling and Lathe machines and their operations	• At the end of this unit Student should be able to Select& use of drilling machine • Use of drilling operation & methods of drilling • Function of drilling machine • Use of work holding devices, • Vice, angle plate, 'V' block, 'C' clamp • Application & use of drills • Centre drill counter base, counter sink • Application & use of drill chuck, sleeves, drifts, tapping, attachment • Use & application of drilling, tapping, counter sink, counter boring, and their Calculation of speed, feed, depth of cut. • Selection & use of lathe machine, Parts of lathe machine. • Types of work holding device & it's material • Types of cutting tool • Types of cutting tool/holder & it's classification • What is speed feed pin of cut? • Types of operation Construction • Types of cutting fluid • Selecting & use of milling machine • function of milling machine & it's part • Type of work holding devices • Design & types of cutting tools construction • Cutting tool holder • Tool geometry speed feed & depth of cut	• Understand different types of drilling machine classification Of drilling machine drilling operation • Parts of drilling machine • Type of work holding devices • Vice, angle plate, 'V' block, 'C' clamp • Design, types & construction of drills, center drills, counter bark, counter sink • Design, types & construction of drill chuck, sleeves, tapping attachment • Speed, feed, depth of cut, cutting fluid • Drilling, counter sink, counter boring, reaming, tapping • Understand in detail about types of lathe machine and classification • Function of lathe machine & it's part • Use & application of 3-jaw chuck,4-jaw chuck, read center, revolving center, face plate • Use & application of single point cutting tool, rough cutting tool, finishing tools, growing tool • Use & application of drill chuck, tool post, indexing tool post, quick change tool holder • Calculation of speed, feed & depth of cut. • Time calculation • Use of cutting fluid • Application & use of plan turning, shoulder turning, grooving, facing, knurling, eccentric turning, chamfering • Understand in detail about • Type of milling machine • Application of milling machine & it's part • Use & application of universal vice, sine vice, rotary table	25	40
			Review & class test		

NOS /Module: WORKSHOP PRACTICE-I

NOS /Module Code: MSME/DTE/03

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
3. Get knowledge about different machine used in workshop like milling, turning, grinding, etc.
4. 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. • Turning • Milling • Surface grinding • Maintenance of machine tools	• To make the exercise jobs and the part of press tools such as bushes, pillars • Utilities items like center punch, studs, nuts • Operation likes turning, facing, step turning, parting, recessing, undercutting, thread cutting • Making V block, Face milling, step milling, profile milling, face milling, slot milling, step milling, groove milling. • Grinding exercise • Surface grinding, external grinding, cylindrical grinding, internal cylindrical grinding	180	100

NOS /Module: COMPUTER APPLICATION

NOS /Module Code: MSME/DTE/04

Outcomes:

After completion of course Student should be able to

1. Use the fundamental features and history of computer
2. Understand the function and name of different types of devices used in computer
3. Understand the computer languages and make program using these computer languages
4. Understand and use if MS word, excel and power point

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Basics of computer	• At the end of this unit Student should be able to understand the uses of applications of the computer • Use of applications of the computer components of computer • Principles of computer operations • Classification of Computers • Input devices • Output devices • Storage devices • Microprocessor unit • Overview of the various computer systems	• Introduction how to start and operate computer. • History of computer • Parts of computer • New invention in computer • Introduction use & application of Computer system in industry • Generation of computer system • Principle of Evaluation of computer system • Key Board, mouse, joystick, light pen Introduction of use & application of different input devices • Types of input devices • Principles of feeding data into computer system • Introduction of use & application of data storage devices • Definition of storage devices • Principles of data storage • Introduction of use & application semiconductor devices in computer system • Definition of semiconductor devices • Principle of microprocessor unit, operation of Microprocessor unit in computer system • Introduction of use & application of different computer systems • Definition of P2, Celeron P3, P4 • Principle of application of computer system, • latest computer used system	8	10
Unit II	Data representation & number system	• At the end of this unit Student should be able to understand the data representation with in computer & codes • Number system • Algorithm & flowchart	• Introduction of use & application of different data types & their representation • Definition of data types, data representation, data encoding • Principle of study the concept of data representation, data types • Introduction use & application of different Number system	3	10

			• Definition Concept of different number system data representation, data on version, data interpretation • Principle of numbers system, data representation, data conversion • Introduction of use & application of algorithm &flowchart • Definition of algorithm, decision table, flowchart • Principle of algorithm development, flowchart development		
Unit III	Computer language	• At the end of this unit Student should be able to understand the Computer codes, machine code, assemble code and Machine Code	• Introduction of computer codes, machine code and assemble code • Definition of concept machine structure, machine language • Principle of assembly language	3	15
Unit IV	Operation system	• At the end of this unit Student should be able to understand introduction to operating system • Disk operating system • To know different type of operating system	• Concept of operating system, computer structure, networking • Principle of operating system, • Principle of windows NT, windows 95, windows 2000	3	10
Unit V	MS Word	• At the end of this unit Student should be able to understand • Ms word page design with column, tables & using graphics • Ms word of page design with columns tables & graphics	• Introduction of use & application of graphics & designing page for extra impact • Definition of concept table creation & revision, creating animation handling line breaks, page break • Principle of table creation & revision inserting object creating animation	3	15
Unit VI	MS Excel	• At the end of this unit Student should be able to understand Ms excel 2000 basics • Excel files, work books, mathematical operations used in excel sheet printing workbook and graphs generation • Ms excel -Text, borders, colours • Ms excel graphics & objects •	• Introduction of use & application of excel 2000 • Definition of concept entering data, file & work books, mathematical graphs. • Principle of entering data into excel sheet organizing files excel sheet creating graphs. • Introduction of application of text, data, format, color, shading, style, size alignments, format number data & time format, custom data format, color border, fill, shading, background • Principle of text style, size alignment, format data, format boarder • Introduction application of graphics object, clip, art, multiple, graphic object • definition graphics object clip art, word art, multiple graphics objects • Principle of graphics object clip art, word art, multiple graphics objects	5	20

Unit VII	MS Power Point	• At the end of this unit Student should be able to understand PowerPoint 2000 basics • PowerPoint wizard presentation perspective sliders auto layout, text objects clipart and pictures text object • Power point presentation • PowerPoint with drawing	• Introduction of use and application of various power point features wizard, layout clipart, perspective, pictures • Definition concept of PowerPoint wizard presentation perspective sliders. • Principle of auto content wizard presentation perspective • Introduction of use and application of color, slides show, animations. • Definition concept of customizing of color scheme • Principal of customizing presentation customizing background, formatting the masters • Introduction of text boxes shape, objects, shadows, 3D effects • Definition concept of formatting and text box, drawing object together grouping and ungrouping objects, drawing special effects principle	5	20

NOS /Module: MATHEMATICS-I

NOS /Module Code: MSME/DTE/05

Outcomes:

After completion of course Student should be able to

1. Understanding facts, concept, of mathematical needs in technical subjects.
2. Use of mathematical technique to solve engineering technique.
3. To develop mathematical skills among students.

THEORY HOURS: 50 PRACTICAL HOURS: NA THEORY MARKS: 100 PRACTICAL MARKS: - NA

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Algebra	• After completion of course Student should be able to understandwhat is sequence and series. • general terms of a series, • formulation of series. • Factorial notation. • Principle of partial fraction. • Determinants and matrices • Permutation and combination • Exponents and its series.	• Sequence and series • Arithmetic progression • Geometrical progression • Harmonica progression • Permutation • Combination • Binomial theorem • Partial fractions • Determinants • Exponential series	15	20
Unit II	Trigonometry	• After completion of course Student should be able to understand the properties of triangle. • Relation between sides & angle of triangle. • Sums& difference formula.	• Trigonometric ratio • Properties of triangle • Trigonometric equations	10	40
Unit III	Differential calculus	• After completion of course Student should be able to understand definition of function, constant, variable, limit & evaluation of limits • Logarithm function • Trigonometric functions • Partial differentiations	• Successive Differentiation • Tangent & normal, Curvature, Maxima & minima • partial Differentiation • Velocity and acceleration applications.	25	40

NOS /Module: APPLIED SCIENCE

NOS /Module Code: MSME/DTE/06

Outcomes:

After completion of course Student should be able to

1. Understanding facts, concept, of physics to develop new technology.
2. Use of physics technique to solve engineering technique.
3. Knowledge of science which helps the students to develop by applications of newer technologies.
4. Understanding facts, concept, of chemistry to develop new structure and properties of matter.
5. Learning about changes in structure and properties in all engineering process changes.
6. Use of chemistry to solve engineering activities and processes.

THEORY HOURS: 60 PRACTICAL HOURS: NA THEORY MARKS: 100 PRACTICAL MARKS: NA

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
Unit I	Physics and its importance in technical education. & S.I unit	• After completion of course Student should be able to understand importance of fundamental science • Purpose of learning physics • Applications in daily life • After completion of course Student should be able to understand types of unit and its importance	• Introduction to physics • Purpose of learning physics • Applications in daily life • S.I units, base and supplementary units, derived units. • Units and dimensions with symbols, abbreviation &precaution.	2	4
Unit II	Force and motion	• After completion of course Student should be able to understand distinction between rotary and circular motion, velocity, time and distance graph • After completion of course Student should be able to understand centripetal and centrifugal forces, banking of roads and bending of cyclist • After completion of course Student should be able to understand examples of periodic motion necessary conditions for the appearance and pursuance of periodic motion	• Classification of motion • Concept of particle in mechanism • Characteristic of different type of motion, • Newton's law of motion • Circular motion and related physical quantities • Relation between linear and angular velocity. • Classification of periodic motion based on forces acting on the source • Condition for the motion • Characteristics of SHM	3	4
Unit III	Waves and wave motion	• After completion of course Student should be able to understand wave equation	• Wave propagation • Wave equations • Transverse waves	2	2

			• Longitudinal waves.		
Unit IV	Gravitation	• After completion of course Student should be able to understand what is gravity • Newton's principle • principle and technique of launching of artificial satellite ,natural and man-made satellite	• Newton's law of gravitation, • gravitation field, • relation between 'G' and 'g'. factors influencing 'g'. • Conditions for overloading and weightlessness in space	2	5
Unit V	Molecular phenomena in solid liquid and gases	• After completion of course Student should be able to understand what is matter, its classifications and properties • Kinetic theory of matter • relation of internal energy with quantity of heat and temperature.	• Order of mass, size, and speed of motion of a molecule in matter, • Molecular theory • Brownian motion and diffusion of gases, liquid and solid. • Random motion of mole • kinetic and potential energy of moles, internal energy.	3	4
Unit VI	Kinetic theory of gases	• After completion of course Student should be able to understand kinetic interpretation of temperature, absolute zero • Gas law's • concept of kinetic theory.	• Perfect gas equation, • postulates of kinetic theory of gases, • pressure exerted by a perfect gas	3	5
Unit VII	Surface tension& Viscosity	• After completion of course Student should be able to understand the effect of temperature on ST of liquids and gases. • Experimental determination of ST of liquid by capillary rise • After completion of course Student should be able to understand by experimental determination by Posethic's method, • dependence of viscosity of liquids on temperature, application	• Molecular forces, cohesive and adhesive forces. • Free still surface of a liquid tries to contract and its behavior as a stretched membrane. • Definition of surface tension. • Capillarity phenomena in science and engineering, • Concept of viscosity of fluids. • steady streamline flow and turbulent flow, • viscous flow, • Critical velocity. • Newton's law of viscous flow.	3	5

Unit VIII	Heat, work And Heat transfer	• After completion of course Student should be able to understand first law of thermodynamics • mechanical equivalent of heat, • concept of latent heat of fusion of ice & vaporization of water • After completion of course Student should be able to understand natural and forced convection • ventilation of buildings • radiation • good and bad radiations • absorbers • Provost's theory • Stefan-Boltzmann law	• Nature of heat energy, • Relation of temperature of a substance with K.E of the motion of the molecules. • Relation of internal energy of a body with quantity of heat • Modes of heat transfer • concept of conduction, convection, radiation and evaporation transfer of heat. • variable and steady state of heat conduction thermal conductivity	3	4
Unit IX	Atomic structure & nuclear chemistry	• After completion of course Student should be able to understand importance of fundamental chemistry • Radioactivity, Alfa gamma & beta rays	• Discovery of electron, nucleus, proton &electron, atomic number, atomic mass • Bohr's burry scheme • Sub shells, electro-valency&co-valency • Theory of radioactivity group displacement law • Half-life period • atomic fusion and fission	3	5
Unit X	Colligative properties and chemical energies	• After completion of course Student should be able to understand effect of temperature catalysis.	• Osmosis & osmotic pressure • Relative vapour pressure &Routl's law • Internal energy, entropy and enthalpy	3	3

Unit XI	Chemical equilibrium	• After completion of course Student should be able to understand Le- chateliers principle • Effect of temperature, pressure & concentration in NH3	• Rate of reaction • factors effecting rate of reaction, • reversible reaction • law of mass action & its application to reversible reaction.	3	5
Unit XII	Periodic classification of elements	• After completion of course Student should be able to understand classification on basis of, p, d, f model • Actinide and lanthanide series.	• Dobernior, newland, luther-mayer, Mendeleev laws of classification • Advantages and disadvantages and limitation, periodicity, electron affinity • Modern periodic table	3	5
Unit XIII	Red oximetry	• After completion of course Student should be able to understand Redox reactions • Calculation of chemical equivalents on its basis.	• Explanation of oxidation & reduction, oxidation number & its calculation. •	3	3
Unit XIV	Electrochemistry	• After completion of course Student should be able to understand electroplating of Cu and Ni.	• Explanation of electrolysis • Faraday's laws of electrolysis	2	3
Unit XV	Chemical process technology	• After completion of course Student should be able to understand their sheet diagram for manufacture of sodium bicarbonates and ammonia	• Explanation of unit process in the manufacture of sodium carbonate& ammonia.	3	5
Unit XVI	Metals & alloy, Corrosion of material and its prevention	• After completion of course Student should be able to understand composition& uses of steel, brass, bronze and duralumin alloy. • After completion of course Student should be able to understand modification of environmental properties of metal • Use of protective coatings anodic &cathode protection • modification in design and choice of material.	• General principles and terms used in metallurgy • purification and extraction of Cu, Fe & Al • Oxidation - reduction process, definition of corrosion • Atmospheric corrosion, pitting corrosion, water line corrosion, corrosion due to temperature - moisture	5	10
Unit XVII	Corrosion of material and its prevention	• After completion of course Student should be able to understand modification of environmental properties of metal	• Oxidation - reduction process, definition of corrosion • Atmospheric corrosion, pitting corrosion, water line corrosion, corrosion due to temperature -	4	5

		• Use of protective coatings anodic &cathode protection • modification in design and choice of material.	moisture		
Unit XVII	Ionization, pH, corrosion and protection	• After completion of course Student should be able to understand protection against corrosion.	• Arrhenius theory of ionization • factors effecting ionization • hydrolysis of salts, acids, bases, • pH meaning numerical. • Buffer solutions and buffer actions. • Indicator and its choice in acidi-metry and alkali-metry (pH curves) •	3	5
Unit XVII	Carbon Chemistry	• After completion of course Student should be able to understand laboratory preparation properties and uses of acetylene • Laboratory preparation properties and uses of ethyl alcohol.	• Saturated and unsaturated hydrocarbons. • Isomerism.	2	4
Unit XVII	Highpolymer	• After completion of course Student should be able to understand different types of high polymers and their application.	• Highpolymer, polymerization and condensation, • classification of plastics, • Preparation, properties and uses of PVC and polythene. • Synthetic Fibers, nylon, rayon, Dacron, Orland polyesters.	2	5
Unit XVII	Galvanizing and electroplating	• After completion of course Student should be able to understand definition of electroplating, principles and factors influencing electroplating	• Definition, classification, types and factors influencing galvanizing. • Definition of electroplating, • principles and factors influencing electroplating, • Electroplating of Copper and Nickel in regular and irregular articles.	2	5
Unit XVII	Pollution and Control	• After completion of course Student should be able to understand effect of waste and waste products in the environment.	• Introduction and chemical toxicology, • Air and Water pollution, • Control of air and water pollution.	1	4

NOS /Module: ELECTIVE

NOS /Module Code: MSME/DTE/07

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

SEM-II

NOS /Module: ENGINEERING DRAWING-II

NOS /Module Code: MSME/DTE/09

Outcomes:

After completion of course Student should be able to:

1. Understand different types of development of surface and its importance in drawing.
2. Application of elements in drawing.
3. Understand and use Assembly drawing and detail drawing in industrial projects.

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

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	PR hours	PR Marks
UNIT-I	Surface texture, limits, fits and tolerances, geometrical tolerance	• At the end of this unit Student should be able to • Understand about Tolerances, limits, fits and Surface texture. • Geometric tolerance symbols and characteristics.	• Definition of single and related feature, • Classification and use of surface texture. • Type of geometrical tolerance • Rules of geometrical tolerance, procedure of drafting and symbol, tolerance and various characteristics.	5		20
UNIT-II	Development of surface	• At the end of this unit Student should be able to • Understand the Different Section view drawing and its detail view • Development of different types of surfaces • Interpenetration of solids	• Type of section • Sectional view • Assembly section • Principal of sectioning & BIS norms. • Procedure of selecting and drawing of section views. • Parallel line development radial line development, • Triangular development, approximate development	5	10	25

			• Intersection of two plane surfaces, intersection of two curved surfaces, intersection of plane surface and curved surface.			
UNIT-III	Drawing of assembly	• At the end of this unit Student should be able to • Understand the Practical drawing in different temporary joints as per BIS standard which is used for assembly	• Definition & introduction of element of assembly • definition of temporary joints • screw Thread • bolts, nuts • dowels, washers • spring • Permanent joints. • standard elements as per BIS being used for assembly • Section and representation of different elements in used in assembly.	5	15	25
UNIT-IV	Drawing of sub assembly &Assembly	• At the end of this unit Student should be able to • Understand the Assembly and detail drawing any object.	• Introduction to Assembly drawing • Introduction to detail of Assembly drawing • Title block, bill of material block modification block. • Relationship of assembly drawing. • Detail drawing and bill of material. • Procedures for Drawing of assembly draw and detail Drawing. • Detail drawing and with bill of mat. for simple job like. • Jig & fixture • press tools (single operation) • injection mold (single cavity)	5	15	30

NOS /Module: WORKSHOP TECHNOLOGY-II

NOS /Module Code: MSME/DTE/10

Outcomes:

After completion of course Student should be able to

1. Use and application of different machine as per requirement
2. Understanding different types of machine and their operation and use of cutting fluid
3. Customize the use of different machine as per manufacturing of part
4. Calculation of speed, feed and depth of cut and its importance

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	Machines and operations of Drilling, Planning, Slotting, Turning, Milling and Grinding	• At the end of this unit Student should be able to Selection & use of drilling machine • Use of drilling operation & methods of drilling • Function of drilling machine • Use of work holding devices • Vice, angle plate, 'V' block, 'C' clamp • Application & use of drill chuck, sleeves, drifts, tapping, attachment • Selection & use of lathe machine • Parts of lathe machine • Types of work holding device & it's material • Types of cutting tool • Types of cutting tool/holder & it's classification • Selecting & use of milling machine • function of milling machine & it's part • Type of work holding devices • Design & types of cutting tools construction • Cutting tool holder	• Understand different types of drilling machine Classification of drilling machine drilling operation • Parts of drilling machine • Type of work holding devices • Vice, angle plate, 'V' block, 'C' clamp • Design, types & construction of drills, centre drills, counter bark, counter sink, drill chuck, sleeves, tapping attachment • Drilling, counter sink, counter boring, reaming, tapping • Understand in detail about types of lathe machine and classification Function of lathe machine & it's part Use & application of 3-jaw chuck,4-jaw chuck, read centre, revolving centre, face plate • Use & application of single point cutting tool, rough cutting tool, finishing tools, growing tool • Use & application of drill chuck, tool post, indexing tool post, quick change tool holder • Time calculation	10	30

		• Tool geometry speed feed & depth of cut • Types of milling operation Construction • Use of grinding machine • Application & use of vices, sine table, angle table, 'V' block • Use and selection of planning operation and planer • Use and selection of slotting operation and slotting machine	• Application & use of plan turning, shoulder turning, grooving, facing, knurling, eccentric turning, chamfering • Understand in detail about • Type of milling machine • Application of milling machine & it's part • Use & application of concave and convex form cutters, t-slot cutters, saws boring cutter solid carbide cutters, carbide inserts • Type of cutting tool holder construction • Calculation of no. of teeth, machining time speed, feed, depth of cut, selection of cutting fluid • Application & use of profile milling, key ways, sawing slits & 'T' slot • Understand in detail about the types of grinding machine • Types of vices, sine table, angle table, 'V' block construction • Factors of cutting tool, work material, machine		
UNIT-II	Pantograph and single lip grinder	• At the end of this unit Student should be able to • Understand Pantograph machine and operations • Concept of main parts and functions of machine • Work holding devices • • single lip grinder machine and operations • Concept of main parts and functions of machine • Work holding	• Operation and principle of pantograph machine and parts, • Various steps performed on pantograph • Operation and principle of single lip grinder machine and parts, • Various steps performed on single lip grinder operation • Work holding attachment cutting tools	5	25
UNIT-III	Milling, Grinding and Gear cutting techniques	• At the end of this unit Student should be able to understand • Tool geometry speed feed & depth of cut • Types of milling operation Construction • Use of grinding machine • Application & use of vices, sine table, angle table, 'V' block • Use of grinding wheel, grinding	• Calculation of no. of teeth, machining time speed, feed, depth of cut, selection of cutting fluid • Application & use of profile milling, key ways, sawing slits & 'T' slot • Types of grinding machine • Types of vices, sine table, angle table, 'V' block construction	10	15

		wheel dressing • speed, feed, depth of cut • gear cutting technique	• Grinding wheel nomenclature, common grinding wheel • Calculation of speed feed, depth of cut • concept of gear manufacturing technique • principle of cutters and setting up machine and accessories		
UNIT-IV	Jig boring, Profile grinding, and EDM process	• At the end of this unit Student should be able to understand • Operation in copy milling machine • Jig boring operation • Function of machine setting up machine for operation • EDM process • Function of EDM cutting parameter operation	• Steps performed in copy milling and milling machine operation • Type of machine & types of machining method • Main part of machine work holding devices cutting tool's type • Steps performed in copy milling and milling machine operation • Concept of EDM, wire cut processes • Main part work holding device, tool holding devices, cutting tools, and material	10	10
UNIT-V	Types of non-conventional machines	• At the end of this unit Student should be able to understand types and application of non-conventional machines Its importance in industry • Main parts of these process and their machine	• Concept and function of electro chemical machining • Concept and function of ultrasonic machining • Concept and function of abrasive jet machining • Concept and function of electronic beam machining • Concept and function of chemical machining • Concept and function of electro chemical grinding • Concept and function of ion beam machining • Concept and function of laser beam machining • Concept and function of plasma arc machining • Rapid prototyping • Various steps to performed these process	10	10
UNIT-VI	Polishing, Lapping and Honing	• At the end of this unit Student should be able to understand types and application of polishing, lapping, honing • Its importance in industry	• Concept and function of polishing, lapping, honing materials and polishing, lapping, honing machine • Selection of polishing, lapping, honing materials and polishing, • Different technique of polishing , lapping, honing	5	5
UNIT-VII	Electroplating , Blasting and Galvanizing	• At the end of this unit Student should be able to understand working principles of process Functions and features of these process	• Concept and function of electroplating • Concept and function of blackening • Concept and function of shot blasting • Concept and function of galvanizing • Various steps to performed these process	10	5

NOS /Module: WORKSHOP PRACTICE-II

NOS /Module Code: MSME/DTE/11

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. • Understand different parameter for use of different machines. • Different process regarding workshop and store	To understand about • Heat treatment & hardness testing • Basic cylindrical grinding • Basic tool & cutter grinding • Fundamentals of dimensional metrology • Store management & material preparation.	180	100

NOS /Module: APPLIED MECHANICS

NOS /Module Code: MSME/DTE/12

Outcomes:

After completion of course Student should be able to

1. Understand different principle of mechanics.
2. Application of mechanics in general engineering and tool and die making problems.
3. Understand and analyses problems encountered in core technological subjects.

THEORY HOURS: 30 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	• At the end of this unit Student should be able to understand Scalar and vector quantities System of units Principle of abbreviation, symbols, units of quantities.	• Scalar and vector quantity and application • Concept of scalar quantity, vector quality. • Principles of system of units, scalar quantities, vector quantities. • Related Problems on scalar and vector quantities. • System of units, standard quantity and derived quantity. • Units of C.G.S. system, systems of international (S.I). • Rules for writing abbreviations, standard quantity, derived quantity. • Related problems on units and standard quantities.	2	5
UNIT-II	Coplanar concurrent forces	• At the end of this unit Student should be able tounderstand • Principle of statics • Equilibrium of coplanar concurrent forces. • Lami's theorem. • Resolution and resultant, graphical methods. • Newton's third law.	• System of forces and its application. • Concept of force, type of forces, resultant of forces, composition of force, resolution of force. • Concept of Bow's notation. Principle of force, type of forces, resultant of forces, composition of force, resolution of force. • Related problems of System of forces of finding resultant force. • Concept of condition of Equilibrium, • Parallelogram law of forces,	3	12

			• Triangle law of forces, • Free body diagram. • Related problems on equilibrium of coplanar, concurrent forces		
UNIT-III	Coplanar, parallel and non-concurrent forces	• At the end of this unit Student should be able to understand • Moments • Lami's theory. • Principle of parallel forces, unlike parallel forces, non-concurrent force, couple, resultant force. • Condition of equilibrium. • Varignon 's principle •	• Coplanar, parallel and non-concurrent force and application. • Concept of parallel forces, unlike parallel forces, non-concurrent force, couple, resultant force, condition of equilibrium. • Related problems on parallel and unlike parallel forces, non-concurrent force. • Concept of moment, types of moments, law of moments. • Resultant force. • Related problem and application of moment.	5	12
UNIT-IV	Centre of gravity	• At the end of this unit Student should be able to understand • Concept of centre of gravity, • centroid, • symmetry consideration • theorem of moments, • Axis of symmetry. • State of equilibrium and application.	• Centre of gravity and centroid for basic shapes and solids. • Principle of centre of gravity, centroid, symmetry consideration, theorem of moments, axes of symmetry. • Related problems on centre of gravity or centroid of basic shapes or solids. • Concept of stability, equilibrium, types of equilibrium, magnitude of force. • Related problems in equilibrium and stability	5	15
UNIT-V	Friction	• At the end of this unit Student should be able to understand Friction in engineering field.	• Concept of friction, limiting friction, Co – efficient of friction, angle of friction, laws of friction • Study problem, identify and categories problem, select laws of friction, describe solution.	2	12
UNIT-VI	Rectilinear motion	• At the end of this unit Student should be able to understand • Terms related to motion • Laws of motion • Application.	• Motion, uniform velocity, variable velocity acceleration. • Concept of motion, speed, velocity, acceleration, distance traversed. Concept of momentum, Newton's laws, forces equation from second law of motion, piles, lift, and bodies tied with string.	3	10

UNIT-VII	Curvilinear motion	• At the end of this unit Student should be able to understand the application of • angular displacement • velocity • acceleration • centrifugal forces • Centripetal forces.	• Concept of angular displacement, angular velocity, angular acceleration, tangential velocity, • Relationship between angular acceleration & linear acceleration, • Relationship between tangential and radial acceleration. • Concept and principles of centripetal forces, centrifugal forces, reaction on wheels, skidding velocity, over hunting velocity, vertical running on rails.	5	12
UNIT-VIII	Engineering application of work, power, energy	• At the end of this unit Student should be able to understand Work done by torque • The application of work done, work done by torque, horse power, torque, speed relationship. • The application of horse power, kinetic energy & potential energy.	• Concept of work done, force-displacement diagram, work done by torque, horse power, torque, speed relationship, work done by rotation. • Concept and principle of horse power, kinetic energy & potential energy, work done & energy.	3	10
UNIT-IX	Simple machine	• At the end of this unit Student should be able to understand the mechanical advantages and velocity ratio in simple machine.	• Concept and principle of mechanical advantages and velocity ratio, work done by machine, simple pulleys, lever, wheel and axle, screw jack, crab winch (single and double)	2	12

NOS /Module: MATHEMATICS-II

NOS /Module Code: MSME/DTE/13

Outcomes:

After completion of course Student should be able to

1. Understanding facts, concept, of mathematical needs in technical subjects.
2. Use of mathematical technique to solve engineering technique.
3. To develop mathematical skills among students.

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	Co-ordinate Geometry	• After completion of course Student should be able to understand definition of different systems • Transformation of co-ordinates • Standards form, general equations	• Co-ordinate system • Distance, division and area • Standard forms of the equations of a straight line • Intersection of straight line • Change of axes • Pair of straight line • General equation of second degree • Circle, Conic section, Parabola • Ellipse, Hyperbola	15	30
Unit II	Vector algebra	• After completion of course Student should be able to understand concept of vectors • Scalar and vector product of two vectors.	• Introduction of vectors • Addition of vectors • Multiplication of vectors • Application of product of vector	15	20
Unit III	Integral calculus	• After completion of course Student should be able to understand definition, fundamental and properties of integration	• Integration • Methods of integration • Application	15	25

Unit IV	Matrix	• After completion of course Student should be able to understand definition of matrix, different types of matrix • Reversal laws, inverse laws	• Matrix • Special matrices • Operation and different laws.	15	25

NOS /Module: MECHANICAL MEASUREMENT AND METROLOGY

NOS /Module Code: MSME/DTE/14

Outcomes:

After completion of course Student should be able to

1. Types of Measurements
2. Linear Measurement Instruments
3. Angular Measurement Instruments:
4. Calibration Methods
5. Sources of Errors in Measurement
6. Systematic and Random Errors

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 Mechanical Measurement and Metrology	• Importance of Accurate Measurements • Types of Measurements • Measurement Standards and Units • Metrology in Industry • Role of Measurement in Quality Control	• Introduction to Metrology • Importance of Accurate Measurements • Types of Measurements • Measurement Standards and Units • Metrology in Industry • Role of Measurement in Quality Control	5	10
Unit II	Measurement Instruments and Devices	• Vernier Calipers • Micrometers • Dial Indicators • Height Gauges • Vernier Calipers • Micrometers • Dial Indicators • Height Gauges	**Linear Measurement Instruments:** • Vernier Calipers • Micrometers • Dial Indicators • Height Gauges **Angular Measurement Instruments**: • Vernier Calipers • Micrometers • Dial Indicators • Height Gauges •	8	20
Unit III	Calibration and Errors in Measurement	• Calibration Methods • Sources of Errors in Measurement • Systematic and Random Errors • Precision and Accuracy • Uncertainty in Measurement Error Analysis	• Calibration Methods • Sources of Errors in Measurement • Systematic and Random Errors • Precision and Accuracy • Uncertainty in Measurement • Error Analysis	8	15
Unit IV	Measurement of Geometric Features	• Measurement of Length, Width, and Height • Measurement of Angles and Tapers • Measurement of Surface Roughness • Measurement of Straightness, Flatness, and Roundness	• Measurement of Length, Width, and Height • Measurement of Angles and Tapers • Measurement of Surface Roughness • Measurement of Straightness, Flatness, and Roundness	8	10
Unit V	Measurement of Mechanical Properties	• Measurement of Hardness • Measurement of Tensile Strength • Measurement of Impact Strength • Measurement of Fatigue Strength	• Measurement of Hardness • Measurement of Tensile Strength • Measurement of Impact Strength • Measurement of Fatigue Strength	8	15

Unit VI	Advanced Measurement Techniques	• Coordinate Measuring Machines (CMM) • Optical Measurement Techniques • Laser Interferometry • X-ray and CT Scanning • 3D Scanning and Non-contact Measurement	• Coordinate Measuring Machines (CMM) • Optical Measurement Techniques • Laser Interferometry • X-ray and CT Scanning • 3D Scanning and Non-contact Measurement	8	15
Unit VII	Statistical Process Control and Quality Assurance	• Introduction to Statistical Process Control (SPC) • Control Charts and Process Capability Analysis • Gage R&R (Repeatability and Reproducibility) • ISO Standards for Quality Assurance	• Introduction to Statistical Process Control (SPC) • Control Charts and Process Capability Analysis • Gage R&R (Repeatability and Reproducibility) • ISO Standards for Quality Assurance	6	5
Unit VIII	Emerging Trends in Metrology	• Nano metrology • 3D Printing and Additive Manufacturing • Industry 4.0 and Metrology • Future Challenges and Innovations in Metrology	• Nano metrology • 3D Printing and Additive Manufacturing • Industry 4.0 and Metrology • Future Challenges and Innovations in Metrology	4	5
Unit IX	Practical Exercises and Lab Work	Skill Development	• Hands-on practice with measurement instruments • Calibration of Instruments • Measurement of different components • Error Analysis and Uncertainty Calculations	5	5

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

NOS /Module Code: MSME/DTE/15

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	-

COURSES / MODULE TEMPLATE

NOS /Module: Employability Skills

NOS /Module Code: MSME/ES/04

Module Hours: 120

Refer Standard Curriculum developed by NCVET. (120-hours-MC-Employability-Skills_v4-DGT (1).pdf)