

MODEL CURRICULUM



Qualification Name:

JR. TECHNICIAN – WELDING

Qualification Code:

Version: 2.0

NSQF Level: 3.0

Model Curriculum Version: 2.0

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

NOS /Module: Interpret Engineering Drawing

NOS /Module Code: MSME/CCWT/01

Outcomes:

After completion of course Student should be able to:

- To scale, line and lettering drawing and practical in different lines and lettering. Drawing of different line and letters in drawing book.
- Understand procedure for drawing, straight line, angles, polygons, circle, all drawing drawn in sketch book.
- Drawing of object as per 1st & 3rd angle projection method
- Drawing projection of plane and point. Drawing of isometric view of different object. Conversion of Isometric view to orthographic projection understand
- Assembly and detail drawing any object.

Theory Hours: 30 Practical Hours: 30 Theory Marks: - 00 Practical Marks: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	PR hours	PR Marks
UNIT-I	Introduction	<p>After completion of unit Student should be able to:</p> <ul style="list-style-type: none"> • Observation of ED. • Definition of sketch mechanical and comp. generated drawing (Identification) 	<p>Understand about</p> <ul style="list-style-type: none"> • Introduction and observation of ED in mfg. industry. • Definition of drawing importance of drawing. Need of dry. General awareness of drawing. Drawing sheet & equipment required in drawing classification of drawing set, imp. Equipment related information. • Drawing instrument, concept of standard drawing 	3	10
UNIT-II	Scale, lines and lettering	<p>At the end of this unit Student should be able to Understand:</p> <p>To scale, line and lettering drawing and practical in different lines and lettering. Drawing of different line and letters in drawing book.</p>	<ul style="list-style-type: none"> • Introduction to scale, line and lettering. • Classification of line and lettering. • Choice and use of BIS norms for scale, line and lettering. • Selecting of Various scales, line and lettering. 	4	15

UNIT-III	Geometric Construction	<p>At the end of this unit Student should be able to Understand:</p> <ul style="list-style-type: none"> • Procedure for drawing, straight line, angles, polygons, circle, all drawing drawn in sketch book. 	<ul style="list-style-type: none"> • Introduction & Advance geometrical Construction <u>Definition</u>: Straight line angles, polygons, circle areas. • <u>Conic Sections</u>: Ellipse, Parabola, Hyperbola. • <u>Other Curves</u>: helix, Cycloid, involutes. 	5	15
UNIT-IV	Orthographic Projection	<p>At the end of this unit Student should be able to Understand:</p> <ul style="list-style-type: none"> • Drawing of object as per 1st & 3rd angle projection method, • Procedure for drawing different view in 1st & 3rd angle. <p>Procedure of indication of dimension</p>	<p>Introduction to orthographic, Different view and plane-identification. Definition of plots, lines, planes, solids. Principal of quadrants and panes.</p> <p>Drawing of difference view of paints in 1st and 3rd angle projection</p> <p>Introduction to dimension, <u>Definition</u>: functional dimension, Non – functional dimension auxiliary dimension.</p> <p>Rules of dimensioning. method of dimensioning</p> <p>indication of dimension</p>	6	20
UNIT-V	Isometric view	<p>At the end of this unit Student should be able to Understand:</p> <ul style="list-style-type: none"> • Drawing projection of plane and point, • Drawing of isometric view of different object. <p>Conversion of Isometric view to orthographic projection</p>	<p>Introduction Isometrics drawing definition of Isometric</p> <p>Isometric projection of planes, prisms, pyramids, cylinders, cones, irregular object.</p> <p>Dimensioning of Isometric drawing chain dimension parallel dimension</p> <p>Oblique dimension Align Dimension Drafting of object.</p>	6	20

			Isometric part drawing drafted in orthographic view as per 1st & 3rd angle projection method.		
UNIT-VI	Elements of assembly	At the end of this unit Student should be able to Understand <ul style="list-style-type: none"> 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.	6	20

NOS /Module: Perform Machining Operation on Conventional Machine

NOS /Module Code: MSME/CCWT/02

Outcomes:

After completion of course Student should be able to:

- Explain various machine tools and their principle functions.
- Describe proper safety rules and environment regulation and housekeeping in machine shop.
- Explain different cutting tools, accessories, instruments used.
- Explain measuring tools and instruments.
- Explain sequence of machining operations.
- Develop their skill & knowledge on operating of conventional machines (Bench Work- filling, layout, sawing, punching, using of tools & instruments.
- Describe and classify hand tools
- Describe and classify machine tools
- Describe and classify measuring instruments

THEORY HOURS: 30

PRACTICAL HOURS: 90

THEORY MARKS: 100

PRACTICAL

MARKS: 100

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH Hours	TH Marks	Pr Hours	Pr Marks
UNIT-I	Introduction to machine shop, tools, machine tools Measuring	After completion of unit Student should be able to Develop their skill & knowledge	• Introduction to Safety work rules and precautions to be maintained in the work	30	100	90	100

	instruments, and Machining	<ul style="list-style-type: none"> - on Bench work and operating of drilling machines - Demonstrate and explain Bench Work- filling, layout, sawing , punching , using of tools & instruments , drill machine and performing of drilling operations , tapping using suitable tools accessories, and measuring instruments - Appropriate parameters setting of drilling, reaming operations - operation sequence for the operations 	<p>shop, housekeeping, causes of accident.</p> <ul style="list-style-type: none"> • Introduction to Bench work, tools, machineries, instruments, machine tools. • Performance on Bench work and drilling Machines. • Introduction and Identify the parts of a file, hammer, chisel, punch, hacksaw, bench vice, and their uses and all features. • Identify the features of a steel rule, divider, try square and its uses. • Identify vernier caliper, common gauges and its uses. • Select material piece, study the drawing of exercise job • Practice sawing, Filing work etc. • Layout and marking of job using surface plate, height gauge, angle plate, vee block, vernier caliper, scriber etc. • Marking as per drawing • Identify & select of drill machine, vice or clamp holding devices, Drill chuck, sleeve, etc. 				
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			<ul style="list-style-type: none"> • Knowing of belt drive and gear drive. • Centre punching, setting of job on machine. Setting parameter on machining. • Operation of Centre drilling, drilling, counter sinking, Counter boring, reaming, boring, etc. using coolants. • Selection of tap, parameter setting and tapping using lubricating oil. • Inspecting of job by measuring tool, gauges. • Cleaning of machine and oiling. 				
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NOS /Module: Carry out Welding Operations (Arc and Gas Welding)

NOS /Module Code: MSME/CCWT/03

Outcomes:

After completion of course Trainee should be able to:

- Understand Institute general discipline, safety precaution, importance of welding, types of welding & its application
- Knowledge about welding simulation process with diagram, structure & techniques follow to use in welding technology
- Knowledge about joining methods & its application, surface cleaning, electricity with safety, heat temperature, principle of arc welding, Uses of gases in welding cutting, joining, types of flames, principle, parameter & its application.
- Knowledge about transformer, motor generator set, rectifier & inverter, A.C., D.C. welding machine, Welding position, slop, rotation, symbols, arc length, type, effects, its application.
- Understand properties of gases, purifier, pressure valve, air liquefaction, charging process, gas regulators & its types, color coding for different gas cylinders, low & high pressure gas welding system, gas welding techniques.
- Understand arc blow welding, its causes & method of controlling, defects, remedies, pipe joints, plate welding, T joints, Y joints, manifold system
- Knowledge about gas welding filler rods & its specification, fluxes, brazing & soldering, defects, causes, Electrode, effects of moisture, their applications

- Understand the weldability of metals, pre & post heating, classification of steel, effects of alloying elements of steel, stainless steel, brass & copper welding methods, aluminum welding method, cast iron & its properties, safety precaution in gas metal arc welding, gas tungsten arc welding etc.
- Knowledge about GMAW, process of MIG/MAG, advantages of GMAW welding, variables, Modes of metals transfer, wire feed systems, welding wires, shielding gases & its application, flux cored arc welding, GMAW defects, causes & remedies.
- Understand heat input & techniques of controlling heat input during welding, pre & post heat weld treatment, submerged arc welding, electro slag & electro gas welding process, thermit welding process
- Knowledge about GTAW process, differentiate b/w AC & DC welding, equipments, TIG, Argon arc, power source for GTAW, types & uses of tungsten electrodes, size, GTAW torches types, pulsed TIG welding, Argon/Helium gas properties, GTAW defects, LBW & EBW
- Knowledge about PAW, PAC cutting process & its operations, Types, resistance welding process, welding parameters, metalizing, manual oxy, welding code & standards, assembly drawing, WPS & PQR, hard facing & surface necessity.
- Understand weld quality inspection, welding mistakes, types of inspection & NDT methods, Cost estimation

Theory Hours: 60

Theory Marks: - 100

OJT Hours: 90

Practical Hours: 240

Practical Marks: 100

Unit No	Unit Name	Unit Level Outcomes	Contents (Chapters/Topic)	Pr Hours	Pr. Marks
Unit – 1	General Introduction & definition of welding	After completion of this unit trainees should be understand knowledge about Institute general discipline, safety precaution, importance of welding, types of welding & its application	<ul style="list-style-type: none"> -General discipline in the Institute - Elementary First Aid. - Importance of Welding in Industry - Safety precautions in Shielded - Metal Arc Welding, and Oxy - Acetylene Welding and Cutting - Introduction and definition of welding. - Arc and Gas Welding Equipments, tools and accessories. - Various Welding Processes and its applications. - Arc and Gas Welding terms and definitions. - Introduction about different simulation techniques used in welding technology before doing welding process with knowledge of safety equipment, simulation of TIG welding process (3-D Virtual simulation) 	10	10
Unit - 2	Study of Joining methods, Heat temperature & Gases	After completion of this unit trainees should be able to knowledge about joining methods & its application, surface cleaning, electricity with safety, heat temperature, principle of arc welding, Uses of gases in welding cutting, joining, types of flames, principle,	<ul style="list-style-type: none"> - Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etc. - Types of welding joints and its applications. Edge preparation and fit up for different thickness. - Surface Cleaning - Basic electricity applicable to arc welding and related electrical terms & definitions - Heat and temperature and its terms related to welding - Principle of arc welding. And characteristics of arc. - Common gases used for welding & cutting, flame temperatures and uses - Chemistry of oxy-acetylene flame - Types of oxy-acetylene flames and uses. - Oxy-Acetylene Cutting Equipment principle, parameters and application. 	20	8

		parameter & its application			
Unit - 3	Arc welding & its uses	After completion of this unit trainees should be able to knowledge about transformer, motor generator set, rectifier & inverter, A.C., D.C. welding machine, Welding position, slop, rotation, symbols, arc length, type, effects, its application.	<ul style="list-style-type: none"> - Arc welding power sources: Transformer, Motor Generator set, Rectifier and Inverter type welding machines and its care & maintenance. - Advantages and disadvantages of A.C. and D.C. welding machines - Welding positions as per EN & ASME : flat, horizontal, vertical and over head position. - Weld slope and rotation. - Welding symbols as per BIS & AWS. - Arc length – types – effects of arc length. Polarity: Types and applications.	20	7
Unit - 4	Gases, its properties & gas welding techniques	After completion of this unit trainees should be able to understand properties of gases, purifier, pressure valve, air liquefaction, charging process, gas regulators & its types, color coding for different gas cylinders, low & high pressure gas welding system, gas welding techniques.	<ul style="list-style-type: none"> - Calcium carbide properties and uses. - Acetylene gas properties and generating methods Acetylene gas Purifier, Hydraulic back pressure valve and Flash back arrestor - Oxygen gas and its properties - Production of oxygen by Air liquefaction. - Charging process of oxygen and acetylene gases - Oxygen and Dissolved Acetylene gas cylinders and Color coding for different gas cylinders. - Gas regulators, types and uses. - Oxy acetylene gas welding Systems (Low pressure and High pressure). Difference between gas welding blow pipe(LP & HP) and gas cutting blow pipe - Gas welding techniques. Rightward and Leftward techniques. 	20	8
Unit - 5	Specification of welding process	After completion of this unit trainees should be able to understand arc blow welding, its causes & method of controlling, defects, remedies, pipe joints, plate welding, T joints, Y joints, manifold system	<ul style="list-style-type: none"> - Arc blow – causes and methods of controlling. - Distortion in arc & gas welding and methods employed to minimize distortion - Arc Welding defects, causes and Remedies. - Specification of pipes, various types of pipe joints, pipe welding positions, and procedure. - Difference between pipe welding and plate welding. - Pipe development for Elbow joint, “T” joint, Y joint and branch joint Manifold system	20	7

Unit - 6	Filler rods & electrode	After completion of this unit trainees should be able to knowledge about gas welding filler rods & its specification, fluxes, brazing & soldering, defects, causes, Electrode, effects of moisture, their applications	<ul style="list-style-type: none"> - Gas welding filler rods, specifications and sizes. - Gas welding fluxes – types and functions. - Gas Brazing & Soldering : principles, types fluxes & uses - Gas welding defects, causes and remedies. - Electrode : types, functions of flux, coating factor, sizes of electrode Coding of electrode as per BIS, AWS, - Effects of moisture pick up. - Storage and baking of electrodes. - Special purpose electrodes and their applications. 	20	7
Unit - 7	Weldability of metals	After completion of this unit trainees should be able to understand the weldability of metals, pre & post heating, classification of steel, effects of alloying elements of steel, stainless steel, brass & copper welding methods, aluminum welding method, cast iron & its properties, safety precaution in gas metal arc welding, gas tungsten arc welding etc.	<ul style="list-style-type: none"> - Weldability of metals, importance of pre heating, post heating and maintenance of inter pass temperature. - Classification of steel. - Welding of low, medium and high carbon steel and alloy steels. - Effects of alloying elements on steel - Stainless steel : types- weld decay and weldability. - Brass – types – properties and welding methods. - Copper – types – properties and welding methods. - Aluminium and its alloys, properties and weldability, Welding methods - Arc cutting & gouging, - Cast iron and its properties types. - Welding methods of cast iron. - Safety precautions in Gas Metal Arc Welding, and Gas Tungsten Arc welding. 	20	8
Unit - 8	Introduction to GMAW systems	After completion of this unit trainees should be able to knowledge about GMAW, process of MIG/MAG, advantages of GMAW welding, variables, Modes of metals transfer, wire feed systems, welding wires, shielding gases & its application, flux cored arc welding, GMAW defects, causes &	<ul style="list-style-type: none"> - Introduction to GMAW - equipment – accessories. - Various other names of the process. (MIG/MAG/CO2 welding.) - Advantages of GMAW welding over SMAW , limitations and applications - Process variables of GMAW. - Modes of metal transfer – dip or short circuiting transfer, spray transfer (free flight transfer) and globular transfer (intermittent transfer) and Pulsed metal transfer. - Wire feed system – types – care and maintenance. - Welding wires used in GMAW, standard diameter and codification as per AWS. - Types of shielding gases and gas mixtures 	20	8

		remedies.	used in GMAW and its applications. - Flux cored arc welding – description, advantage, welding wires, coding as per AWS. - Edge preparation of various thicknesses of metals for GMAW. - GMAW defects, causes and remedies		
Unit - 9	Heat, electro slag & gas welding, thermit welding process	After completion of this unit trainees should be able to understand heat input & techniques of controlling heat input during welding, pre & post heat weld treatment, submerged arc welding, electro slag & electro gas welding process, thermit welding process	- Heat input and techniques of controlling heat input during welding. - Heat distribution and effect of faster cooling - Pre heating & Post Weld Heat Treatment - Use of temperature indicating crayons - Submerged arc welding process – principles, equipment, advantages and limitations - Electro slag and Electro gas welding processes– principles, equipments, advantages and limitations - Thermit welding process- types, principles, equipments, thermit mixture types and applications. Use of backing strips and backing bars	30	7
Unit - 10	GTAW Process & Tungsten electrodes	After completion of this unit trainees should be able to knowledge about GTAW process, differentiate b/w AC & DC welding, equipments, TIG, Argon arc, power source for GTAW, types & uses of tungsten electrodes, size, GTAW torches types, pulsed TIG welding, Argon/Helium gas properties, GTAW defects, LBW & EBW	- GTAW process - brief description Difference between AC and DC welding, equipments , polarities and applications. - Various other names of the process (TIG, Argon arc) - Power sources for GTAW - AC Tungsten electrodes –types & uses, sizes and preparation GTAW Torches- types, parts and their functions - GTAW filler rods and selection criteria - Edge preparation and fit up. - GTAW parameters for welding of different thickness of metals - Pulsed TIG welding – brief description, pulse parameters slope up and slope down. - Argon / Helium gas properties – uses. - GTAW Defects, causes and remedy. - Friction welding process- equipment and application - Laser beam welding (LBW)and Electron beam welding(EBW)	20	10
Unit - 11	Plasma Arc Welding	After completion of this unit trainees should be able to	- Plasma Arc Welding (PAW) and cutting (PAC) process – equipments and principles of operation.	20	10

	& metalizing principals	knowledge about PAW, PAC cutting process & its operations, Types, resistance welding process, welding parameters, metalizing, manual oxy, welding code & standards, assembly drawing, WPS & PQR, hard facing & surface necessity.	<ul style="list-style-type: none"> - Types of Plasma arc, advantages and applications. - Resistance welding process -types, principles, power sources and welding parameters. - Applications and limitations. - Metalizing – types of metalizing principles, equipments, advantages and applications - Manual Oxy – acetylene powder coating process- principles of operation and applications - Welding codes and standards - Reading of assembly drawing - Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) - Hard facing/ surfacing necessity, surface preparation, - various hard facing alloys and advantages of hard 		
Unit - 12	Welding Quality & Inspection	After completion of this unit trainees should be able to understand weld quality inspection, welding mistakes, types of inspection & NDT methods, Cost estimation	<ul style="list-style-type: none"> - Weld quality inspection, common welding mistakes and appearance of good and defective welds - Weld gauges & its uses - Types of Inspection methods - Classification of destructive and NDT methods - Welding economics and Cost estimation. 	20	10

COURSES / MODULE TEMPLATE

NOS /Module: Employability Skills

NOS /Module Code: MSME/ES/01

THEORY HOURS: 30

PRACTICAL HOURS: -

THEORY MARKS: 100

PRACTICAL MARKS: -

Refer Standard Curriculum developed by NCVET. (30-hours-MC-Employability-Skills)