

TAMIL NADU PUBLIC SERVICE COMMISSION

SYLLABUS

TRADE - WELDER [GAS & ELECTRIC]

(ITI STANDARD)

CODE:440

UNIT-I : INTRODUCTION AND DEFINITION OF WELDING:

Safety Precautions SHIELDED METAL ARC WELDING (SMAW) & OXYGEN ACETYLENE WELDING (OAW) Arc and Gas Welding Equipments, Tools and accessories - Various Welding Processes and its applications - Arc and Gas Welding terms and definitions.

UNIT-II : 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, Permanent and Temporary Joints.

UNIT-III : SET THE OXYGEN - ACETYLENE GAS CUTTING PLANT (OAGC) AND OXYGEN - ACETYLENE WELDING (OAW):

Common gases used for Welding & Cutting, Flame temperatures and uses. - Types of Oxygen - Acetylene flame Temperature and uses - Oxygen-Acetylene Cutting Equipment principle, parameters and application.

UNIT-IV : ARC WELDING POWER SOURCES:

Transformer, Motor Generator Set, Rectifier and Inverter Types of Welding Machines and its Care & Maintenance - Advantages and disadvantages of A.C (Alternative Current) and D.C (Direct Current) welding machines.

UNIT V : ARC 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 its applications - Weld quality Testing & inspection, Common Welding mistakes and appearance of good and defective welds - Weld gauges & its uses.

UNIT VI : GAS CYLINDERS AND REGULATORS :

Calcium Carbide uses and Hazard - Acetylene Gas Properties and flash back arrestor - Oxygen Gas and its properties, uses in welding. Charging process of Oxygen and Acetylene gases - Color coding for different Gas Cylinders - Regulator - Single and Double Stage - Oxy and Acetylene Gas Welding System (Low and High Pressure) - Gas Welding Techniques - Rightward and Leftward Technique - Filler Rod - Flux - Specification and uses.

UNIT VII : SMAW DEFECTS:

Arc Blow - Causes and Methods of Controlling - Distortion in Arc & Gas Welding - Pipe Welding - Types of Pipe Joints - Positions - Difference between Pipe & Plate Welding - Pipe Butt Joint - Pipe Development for Elbow, 'T', 'Y' and Branch Joint.

UNIT VIII : ARC WELDING 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. Weldability of metals, Importance of Pre heating, Post heating and maintenance of inter pass temperature.

UNIT IX : TESTING WELDED JOINTS BY DIFFERENT METHOD OF TESTING:

Destructive Test - Nick Break - Free Bend - Tensile - Non Destructive Test - Dye Penetration - Magnetic Particle - X Ray - Gamma Ray.

UNIT X : GAS TUNGSTEN ARC WELDING (GTAW) & GAS METAL ARC WELDING (GMAW) (CO₂) WELDING PROCESS:

Brief Description - AC and DC Welding, Equipments, Polarities and applications. Various Welding Process (**GTAW and GMAW (CO₂)**) - Power sources for **GTAW** - AC [Alternative Current] & DC [Direct Current] - Tungsten electrodes - Types & Sizes - GTAW and GMAW Torches - Types, Parts and their functions - GTAW filler rods and selection Criteria - GMAW - Wire Feed System - Shielding Gases (Argon, CO₂) - **Advanced Welding Process** - Submerged Welding -Thermit Welding - Resistance Welding (Spot, Seam, Projection) - Friction Welding (Flash Butt) - Plasma Arc Welding and Cutting - Plastic Welding (Polypropylene(PP), Polyethylene (PE), Polyvinylchloride(PVC) - Induction Welding.

Workshop Calculation and Science : Unit, Fraction - Square root, Ratio and Proportions, Percentage - Material Science - Mass, Weight, Volume and Density - Heat & Temperature and Pressure - Basic Electricity - Mensuration - Trigonometry.

Engineering Drawing: Introduction - Drawing Instrument - Free Hand Drawing - Geometrical - Hand Tools, Measuring Tools - Fabrication Drawing, Sectional View of Different Types of Welding Joints and Pipe Joints - Symbols used in related Trades - Reading of Job Drawing of related Trades.