

Course Code	Course Name	Credits
26GN956	WELDING ESSENTIALS: TECHNIQUES AND SAFETY	02

Course Description

This course is designed to provide practical knowledge and technical skills in welding essentials, focusing on fundamental welding techniques and safe working practices. It emphasizes hands-on training in various welding processes, enabling learners to perform basic welding operations, understand material joining methods, identify common welding defects, and strictly follow safety standards in workshop environments. The course also supports the development of employability and self-employment skills in fabrication and metal repair work.

Course Objectives

- To provide fundamental knowledge of welding processes, equipment, and safety practices in workshop environments.
- To develop basic hands-on skills in SMAW (arc welding) operations and metal preparation techniques.
- To train learners in performing different welding joints, positions, and cutting operations on mild steel.
- To build awareness of welding defects, inspection methods, and quality control practices.

Skill Enhancement Outcomes

Upon successful completion of this course, the learner will be able to:

- Gain practical proficiency in SMAW welding techniques and metal fabrication tasks.
- Develop competency in joint preparation, welding positions, and oxy-fuel cutting operations.
- Improve ability to maintain weld quality through proper parameter control (current, electrode angle, travel speed).
- Enhance employability skills for entry-level jobs in welding, fabrication, and maintenance sectors.

Course Content and Practical Training

- Safety and Workshop Practices:** Use of PPE (helmet, gloves, apron, goggles, respirators), fire safety procedures, handling fire extinguishers, flashback arrestors awareness, housekeeping (5S), and basic first aid for burns and electric shock.
- Introduction to Welding Equipment:** Familiarization with welding machines (AC/DC, transformer, rectifier, inverter), electrodes, electrode holders, cables, and workshop tools.
- Arc Welding Practice (SMAW):** Arc initiation, straight bead deposition on MS plates, maintaining arc stability, and control of travel speed.
- Electrode Selection and Settings:** Selection of electrode size, current setting adjustment, polarity selection (DCEN/DCEP), and correct electrode angle positioning.
- Metal Preparation:** Cutting, filing, edge preparation (beveling), surface cleaning, and proper alignment of workpieces before welding.
- Fillet Weld Practice:** Performing 1F (flat), 2F (horizontal), 3F (vertical), and 4F (overhead) fillet welds on mild steel plates.
- Butt Weld Practice:** Performing 1G (flat), 2G (horizontal), 3G (vertical), and 4G (overhead) butt joints ensuring proper penetration and bead quality.
- Pipe Welding Practice:** Pipe alignment, root pass and filling techniques in 1G, 2G, 5G, and 6G positions.
- Welding Defects Identification:** Study and identification of defects such as porosity, cracks, undercut, slag inclusion, lack of fusion, and distortion with corrective measures.
- Inspection and Testing Methods:** Visual inspection, dye penetrant test (DPT), and magnetic particle test (MPT) for weld quality evaluation.
- Oxy-Fuel Cutting Practice:** Straight line, bevel, and circular cutting on mild steel plates using oxy-fuel cutting equipment.
- Core Welding Essentials (SMAW):** Control of electrode size, current setting, arc length, travel speed, and electrode angle to achieve sound weld quality.

Learning Outcome

- Understand and apply welding safety procedures, PPE usage, and workshop discipline effectively.
- Identify, set up, and operate basic welding equipment and accessories correctly.
- Perform arc welding operations including bead formation, fillet welds, butt joints, and pipe welding in various positions.
- Detect common welding defects and apply suitable inspection and corrective measures.