

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Diploma in Fabrication Technology

Semester: 3

**Subject Code**

**Subject Name** WELDING TECHNOLOGY-1

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Sr. No.	Course content
1	<b>Introduction To welding :</b> 1.1 Need, Scope & importance of welding in industries 1.2 List of major welding industries in GUJARAT . 1.3 Need of attitude, Knowledge & skill required for shop floor supervisor in welding industries 1.4 Definitions of welding 1.5 Advantages & Disadvantages of welding 1.4 Classification of welding & applied processes. 1.5 Welding as compare to riveting & casting 1.6 Factor affecting of selection of welding process 1.7 Welding terminology
2	<b>Arc welding equipment ( Power source ) :</b> 2.1 Introduction & specification of arc welding power source 2.2 Selection factor of power source 2.3 Classification of power source 2.4 AC power source 2.5 DC power source 2.6 Special type of power source --Inverter system , Thyristorised & transistorized Rectifier with slop control, Universal ,Multi operator  2.7 Static characteristic curves 2.8 OCV 2.9 Static dynamic catachrestic 2.10 Current ratting & duty cycle specification 2.11 Classification of insulation 2.12 Other Accessories e.g. Like cables connector, fans, lead ,electrode holder, bead cleaning, hand shielded, helmet & protecting clothing, etc
3	<b>WELDING ELECTRODES :</b> 3.1 Classification of welding electrodes 3.2 Electrode Details (Constructional sketch) 3.3 Consumable & non consumable electrodes & their types 3.4 Selection of consumable – Cellulosic, Rutile, Acid, Acid rutile, Oxidizing, Iron oxide

	3.5 Electrode Coating ingredients & their functions. 3.6 Care & storage of electrode/consumables ( electrode drying oven ) 3.7 Classification & Coding of electrode as AWS , BIS & ISO 3.8 Testing of electrodes 3.9 Tubular electrode and flux cored wire 3.10 Application of electrodes 3.11 Electrodes shapes, polarity & its effects
4	<b>SHIELDED METAL ARC WELDING ( SMAW ) :</b> 4.1 Definition, Working principle & block diagram 4.2 Power source specification 4.3 Consumable used 4.4 Selection criteria of electrode 4.5 Welding parameters 4.6 MMAW welding process 4.7 Welding sequence 4.8 Type of weld joints 4.9 Welding positions 4.10 Typical procedure sheet for MMAW 4.11 Welding process variables as per ASME sec IX 4.12 Electrodes shape 4.13 Weld gauge 4.14 Welding defects, flaws, discontinuity --- its causes & remedies 4.15 Safety recommendation
5	<b>SUBMERGED ARC WELDING ( SAW ) :</b> 5.1 Definition, Working principle & block diagram 5.2 Advantages, application& limitation 5.3 Basic equipment 5.4 Typical semi automatic welding outfit 5.5 consumable of SAW & its selection 5.6 Process parameter 5.7 SAW procedure 5.8 weld backing process 5.9 SAW cladding 5.10 Joint parameter
6	<b>ELECTROSLAG WELDING ( ESW ) :</b> 6.1 Definition & concepts 6.2 Principle of operation 6.3 Equipment specification 6.4 Consumable guide method 6.5 Non consumable guide method 6.6 Process variables 6.7 Consumable for E.S.W 6.8 Advantages, disadvantages/limitations & applications 6.9 Overlay welding – Process, advantages, limitations & application

7	<b>WELDING CODES :</b> 7.1 Need, scope & importance of various welding codes 7.2 Introduction standard of weld joint 7.3 Indian standard 7.4 AWS codes
8	<b>ARC PHYSICS :</b> 8.1 Introduction 8.2 Welding arc- definitions, Initiation, Structure & Mechanism 8.3 Type of welding arc 8.4 Arc characteristics & anode spot characteristics 8.5 Arc stability 8.6 Arc blow – factors affecting arc blow, mechanism of arc blow, effect of Arc blow & their remedies 8.8 Metal transfer-Types, factor affecting metal transfer , effect of current(amp.), & volume in metal transfer 8.9 Weld bead geometry & features of weld
9	<b>WPS,WPQ,PQR as per ASME sec IX :</b> 9.1 Definition of WPS,WPQ,PQR 9.2 Types of variables ( essentials , non-essentials & supplementary essentials ) 9.3 P-number, F-number, A-number 9.4 Understand importance of QW – 401 to 410 9.5 Understand basic terminology of ASME sec IX 9.6 Prepare WPS,WPQ,PQR as per ASME sec IX only for MMAW/SMAW for carbon steel

### **REFERENCE BOOKS :**

1. Welding Technology For Engineers -- Baldev Raj,V Shankar & A K Bhancuri
2. Welding & Welding Technology -- Richard L Little
3. Welding Technology -- O.P.Khanna
4. Welding Technology -- Nadkarni
5. Welding Technology & Design -- V.M. Radhakrishnan
6. ASME sec IX