GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3722802
Semester – II
Subject Name: Advance Welding Technology

Type of course: Elective III

Prerequisite: Nil

Rationale:
This course provides the knowledge and practice regarding different Welding Process Physics and Characteristics. Students can find easy in different aspects of welding machine and Weldability in Practices. Industries now a days modernized by adopting automated welding systems.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
03	0	02	04	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Physics of welding arc - characteristics of arc and mode of metal transfer, welding fluxes and coatings - type and classification; electrode codes and their critical evaluation	08
2	Welding machine characteristics - conventional and pulsed power sources, inverter type, power sources for resistance welding, weldability - weldability of cast iron, plain carbon and low alloy steels, stainless steels	08
3	Determination of preheat temperature, use of Schaeffler's diagram, weldability tests, heat flow in welding - significance, theory of heat flow, cooling rate determination, selection of welding parameters based on heat flow analysis	08
4	Residual stress and distortion - theory of residual stresses and distortion calculation, welding codes, joint design, analysis of fracture and fatigue of welded joints - fracture, energy consideration, fracture toughness testing and its application to welded joints	08
5	Automated welding systems; microprocessor control of arc welding and resistance welding, quality assurance in welding, welding fumes and their effect on the environment	06
6	Modern welding processes like: EBW, LBW, Under water Welding, Ultrasonic welding etc. welding of ceramics, plastics and composites	07

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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**30**	**20**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Dr. R. S. Parmar "Welding processes and technology" Khanna Publishers
2. Welding technology, R. Little, TMH
3. American society for metals, metal hand book vol.6
4. Welding process technology-houldcraft PT-cambridge univ.press
5. Modern Arc Welding by S V Nadkarni, Advani – Orlikon

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Identify the appropriate welding technique and procedure for the specific application	40
CO-2	Students Can calculate the weld cost.	30
CO-3	Students Can be able to prepare WPS, PQR and WPQ.	30

Term Work:
The term work shall be based on the topics mentioned above.

List of Experiments:

1. Study of the welding process.
2. Effect of various welding parameters on bead characteristics in arc welding.
3. Determination of preheat temperature using Schaeffer's Diagram.
4. Selection of Welding Parameters based on Heat Flow Analysis.
5. Study of welding joint design.
6. Estimation and Costing of welding length.
7. To prepare a WPS, WPQ and PQR as per AWS section IX.

Major Equipment:

(1) Gas Welding set up
(2) Arc welding setup (MMAW, TIG, MIG, SAW)
(3) Ultra sonic Welding Machine
(4) Laser Beam Welding Machine
(5) Automated Welding Systems
(6) Infrared Temperature Gun
(7) Profile cutting setup

List of Open Source Software/learning website:

1. http://www.gowelding.com/
2. http://www.weldingsoftwarepro.com/
3. http://nptel.ac.in/courses/112107077/33
4. http://nptel.ac.in/courses/112107078/
5. http://www.albertatechfutures.ca/RDSupport/Petroleum/BitumenandHeavyOil/EngineeredMaterials/AdvancedWeldingTechnologies.aspx