

# GUJARAT TECHNOLOGICAL UNIVERSITY

## MECHANICAL (PRODUCTION ENGINEERING) (28)

ADVANCE WELDING TECHNOLOGY

SUBJECT CODE: 2722802

SEMESTER: II

Type of course: CORE 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 C	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
		ESE			OEP	PA	RP			
3	2#	0	4	70	30	30	0	10	10	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
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	06	18
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	06	18
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	06	18
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	18
5	Automated welding systems; microprocessor control of arc welding and resistance welding, quality assurance in welding, welding fumes and their effect on the environment	05	15
6	Modern welding processes like: EBW, LBW, Under water Welding, Ultrasonic welding etc. welding of ceramics, plastics and composites	04	13

## 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 Outcome:

After learning the course the students should be able to:

1. Identify the appropriate welding technique and procedure for the specific application.
2. Can calculate the weld cost.
3. Can be able to prepare WPS, PQR and WPQ.

## List of Tutorials:

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 Equipments:

- (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://kto.simtech.a-star.edu.sg/wsqa-graduate-diploma-in-advance-welding-technologies>
6. <http://www.albertatechfutures.ca/RDSupport/Petroleum/BitumenandHeavyOil/EngineeredMaterials/AdvancedWeldingTechnologies.aspx>

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.