

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN METALLURGY ENGINEERING

Semester: 4

Subject Name JOINING OF METALS

Sr. No.	Course content
1.	INTRODUCTION 1.1 Importance & Relevance of Metal joining process in Metallurgy. 1.2 Classification of joining process. 1.3 Safety aspects in Metal joining processes.
2.	SOLDERING AND BRAZING 2.1 Definition of soldering & brazing. 2.2 Difference between Soldering & brazing. 2.3 Basic operations in soldering & Brazing. 2.4 Metallurgical aspects of soldering & brazing. 2.5 Applications of brazing & soldering.
3.	FUSION WELDING PROCESS 3.1 Classification of welding process. 3.2 Gas welding. 3.3 Arc welding process(equipment, fluxes, electrodes, procedures, limitations & advantages of various arc welding process). 3.4 Thermit welding. 3.5 Relative advantages & limitations & applications of gas welding & arc welding.
4.	PRESSURE WELDING 4.1 Resistance welding. 4.2 Cold welding 4.3 Forge welding. 4.4 Relative advantages, limitations & applications of pressure welding.
5.	MODERN WELDING PROCESSES Industrial visit TRS-4 5.1 Electron beam welding. 5.2 Laser beam welding. 5.3 Submerged arc welding. 5.4 Ultrasonic welding. 5.5 Under water welding.

6.	QUALITY CONTROL IN METAL JOINING PROCESS 6.1 Weldability. 6.2 Welding defects & preventions. 6.3 Inspection & testing of joints. 6.4 Special procedures adopted for welding S.S, Al, Cu, Cl, CS. 6.5 Welding standards/ codes/ specifications. 6.6 Cost effectiveness in welding.
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LABORATORY EXPERIENCES:

1. Identify and understand various parts of welding machines and various safety aspects of it.
2. (A) Understand various parts of arc welding machine.
(B) Perform arc welding process and its application.
3. (A) Understand various parts of gas welding machine.
(B) Perform gas welding process and its application.
4. (A) Understand various parts of spot welding machine.
(B) Perform spot welding process and its application.
5. Study modern welding process like
 - (1) Laser beam welding,
 - (2) Submerged arc welding
 - (3) Electron beam welding
6. Perform soldering operation with applications.
7. Identify and understand various welding defects.
8. Perform various DT and NDT for weld joints like Tensile testing, Ultrasonic testing, Visual inspection.

Reference Books:

Sr. No.	Name of Books	Author
1.	Engineering metallurgy I & II	R.A.Higgins
2.	Welding engineering	Little
3.	Welding technology	O.P.Khanna
4.	Soldering, welding and brazing	Lankester
5.	Welding technology	R.S.Parmar
6.	Modern arc welding techniques	S.V. Nadkarni