

COURSE CODE 1152ME125	ADVANCED WELDING TECHNOLOGY	L	T	P	C
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1. Preamble

This course will help the students understand the advanced welding processes and the process parameters.

2. Pre-requisite

Manufacturing Technology

3. Links to other courses

Project work

4. Course Educational Objectives

1. To impart knowledge on various advanced welding processes so that the students can apply them in engineering industry applications.
2. To develop the knowledge on the design of welded joints and the quality control of weldments.

5. Course outcomes

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Apply the knowledge of solid state welding process for engineering applications	K3
CO2	Understand the principles of radiant energy metal joining process.	K2
CO3	Understand the fundamental principles of special arc welding process	K2
CO4	Understand the knowledge of plasma arc in metal joining and cutting process	K2
CO5	Understand the knowledge of design principles in weld joints. Apply the concept of quality control and testing of weldments in industrial environment	K2

6. Correlation of COs with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H				L							M	H	
CO2	H				L							M	H	
CO3	H				L							M	H	
CO4	H				L							M	H	
CO5	H				L							M	H	

H- High; M-Medium; L-Low

7. Course content

UNIT 1 SOLID STATE WELDING PROCESSES

L-9

Fundamental principles, survey of the various pressure welding processes and their applications. Friction, friction stir, explosive, diffusion, and Ultrasonic welding – principles of operation, process characteristics and application.

UNIT 2 ELECTRON AND LASER BEAM WELDING

L-9

Heat generation and regulation, equipment details in typical set-up, electron beam welding in different degrees of vacuum, advantages and disadvantages, applications. Laser Welding: Principles of operation, advantages, and limitations, applications.

UNIT 3 ELECTRO SLAG WELDING

L-9

Heat generation, principles of operations, wire and consumable guide techniques, selection of current, voltage and other process variables, nature of fluxes and their choice. Electro-gas welding: Principle and applications. Narrow gap welding, Under Water welding. Rapid Arc Welding, Welding Automation

UNIT 4 PLASMA WELDING

L-9

Special features of plasma arc- transferred and non transferred arc, key hole and puddle-in mode of operation, micro low and high current plasma arc welding and their applications, plasma cutting, surfacing and applications.

UNIT 5 TESTING AND DESIGN OF WELDMENT

L-9

Design and quality control of welds. Edge preparation types of joints, welding symbols. Stresses in butt and fillet welds – weld size calculations. Design for fatigue. Testing – tensile, bend hardness. Impact, notch and fatigue tests. Life assessment of weldments.

Theory: 45 periods

8. Text Book.

1. Nadkarni S.V., “Modern Arc Welding Technology”, Oxford IBH Publishers, 1996.

9. References

1. Schwartz M.M, “Metals Joining Manual”, McGraw Hill Books, 2001.
2. Tylecote R.F, “The Solid Phase Welding of Metals”, Edward Arnold Publishers Ltd, London, 2000.
3. Parmer R.S., “Welding Engineering and Technology”, Khanna Publishers, 2002.
4. Carry B., “Modern Welding Technology”, Prentice Hall Pvt Ltd., 2002.
5. Nadkarni S.V., “Modern Arc Welding Technology”, Oxford IBH Publishers, 1996.
6. Schwarziz, M.M., “Source book on innovative welding processes”, American Society for Metals (OHIO), 2004.
7. Christopher Davis. “Laser Welding- Practical Guide”. Jaico Publishing House, 2002.