



GOVERNMENT OF TAMILNADU
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI
STATE PROJECT COORDINATION UNIT
(Established under Canada India Institutional Cooperation Project)
CURRICULUM

Course Name	ADVANCED WELDING
Course Code	ME/2020/027
Course Duration	120 Hours
Minimum Eligibility Criteria	8th /ITI/10th/+2
Pre-requisites (if any)	-
Course Objectives	Training module has been designed for the participants to <ul style="list-style-type: none"> • Understand various welding electrodes. • Understand Arc& Gas welding processes. • Identify the different welding defects. • Know the safety practices used in welding. • Understand TIG/MIG welding processes.
Course Outcomes	At the end of training, the participants will be able to <ul style="list-style-type: none"> • Perform Arc/Gas welding for different types of joints. • Perform TIG / MIG welding for different types of joints and positions.
Expected Job Roles	<ul style="list-style-type: none"> • TIG/MIG welder • Arc welder • Gas welder

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of the Examination
				Min	Max	
ME/2020/027	ADVANCED WELDING	Theory	50	10	20	3 hours
		Practical	70	40	80	
		Total	120	50	100	

ME/2020/027 – ADVANCED WELDING
DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	Introduction	5 Hours	
1.1	Classification of welding– practical application of welding – advantages and disadvantages of welding – welding as compared to riveting and casting.	5	
1.2	Welding electrodes – classification of electrodes – consumable electrodes and its types – coating ingredients and their function – manufacture of electrode – selection of electrode – care and storage of electrodes.		
II	Arc welding	30 Hours	
2.1	Power sources for Arc welding – common tools used in welding – basic electricity as applied to welding – arc length and its effect –effect of variations in welding procedures on weldments during MMAW.	10	
2.2	Weld joint preparation – preheating – post heating – electrodes, types, specification, coating. Composition of flux – functions of flux – selection of electrodes – welding symbols – welding position.		
2.3	Safety recommendations in welding– safety in installation and operation of arc welding equipment – explosion, fire and other hazards – protection of welder.		
2.4	Practical: Straight line practice - Butt joint - Lab joint - T joint - Corner joint - T joint – Horizontal, Vertical, Overhead - Corner joint – Down hand, Horizontal, Vertical - Single V Butt joint – Down hand, Horizontal, Vertical - T joint all position.		20
III	Gas welding	20 Hours	
3.1	Classification – principle and operation of gas welding – chemistry of oxy acetylene flame – flashback and backfire – three types of flame – Gas welding equipments – welding techniques, leftward techniques, rightward techniques – fluxes – advantages disadvantages and applications of gas welding – safety in installation and operation of gas welding– soldering and brazing.	10	
3.2	Practical: St. Line practice - Butt joint - Corner joint - T joint.		10
IV	TIG Welding	30 Hours	
4.1	Tungsten Inert Gas (TIG) welding – principle and operation – equipment - torches - electrodes - shielding gases - base metals – joint design – defects, causes and remedies - trouble shooting - advantages, disadvantages and applications.	10	

4.2	Practical: St. Line without filler rod - St. Line with filler rod - Single V Butt joint - Single V Butt joint – Down hand - Tube Butt joint – 1 G, 2 G, 5 G, 6 G, 6 GR.		20
V	MIG Welding and Defects in welding	35 Hours	
5.1	Metal Inert Gas (MIG) welding – principle and operation- equipment and accessories – wire feed unit - torches - welding wires - shielding gases - metals welded – joint design – defects, causes and remedies - trouble shooting - advantages, disadvantages and applications.	15	
5.2	Defects in welding-Causes and remedies-Stress relief heat treatment of weldments. Inspection and testing of welded joints – Destructive and Nondestructive test – magnetic particle test– dye penetrant test – radio graphic and ultrasonic test.		
5.3	Practical: St. Line practice - Lab joint – Down hand - T joint – Down hand - T joint – Horizontal - Corner joint – Down hand - Single V Butt joint – Down hand.		20
Total Theory and Practical Hours		50	70
Total Hours		120	

HARDWARE REQUIREMENT

S. NO.	LIST OF TOOLS / EQUIPMENTS
1.	Arc welding unit & accessories
2.	Gas welding unit & accessories
3.	TIG welding unit & accessories
4.	MIG welding unit & accessories

REFERENCE BOOKS

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
01	Welding Technology	O.P.KHANNA	Dhanpat Rai publishers, New Delhi
02	Welding process and Technology	Dr.R.S.Parmar	Khanna publishers, New Delhi
03	Welder Trade - Theory and Practice	--	NIMI, Chennai

ASSESSMENT AND CERTIFICATION

S. No.	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max.Marks
1.	Theory Examination	20
2.	Practical Examination	
	a) Aim and Procedure	20
	b) Demonstration / Execution	25
	c) Result & Viva Voce	15
	d) Record	20
Total Marks		100

THEORY MODEL QUESTION PAPER

ME/2020/027 – ADVANCED WELDING

(MAXIMUM MARKS : 20)

(N.B: Answer any **Twenty** questions)

20 x 1 = 20 Marks

1. How to select the electrodes?
2. How to take care of the electrodes?
3. What is the need for welding?
4. List out any two manufacturers of electrode.
5. List out any two types of resistance welding.
6. Compare AC generator with AC transformer.
7. Explain about heavily coated electrode.
8. List out any two commonly used flux materials.
9. For which position, 5G stands for?
10. Why stainless steel is difficult to weld?
11. What will happen to the worker, when proper ventilation is not provided in the work area during welding?
12. When did explosion take place?
13. What is meant by carburizing flame?
14. List out any two disadvantages for gas welding.
15. What is rightward technique?
16. What is meant by brazing?
17. List out any two remedies for flashback.
18. Which polarity is used in TIG welding?
19. Why do we prefer TIG welding?
20. What is the basic concept of TIG welding?
21. List out any two base metals used in TIG welding.
22. List out any one defect with causes and remedies in MIG welding.
23. List out any two advantages for MIG welding.
24. List out the causes for inadequate penetration.
25. List out any two defects which can be identified using LP test.