



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

Course Name	<b>HITECH WELDING</b>
Course Code	ME/2020/028
Course Duration	430 Hours
Minimum Eligibility Criteria	8 <sup>th</sup> Std
Pre-requisites (if any)	-
Course Objectives	<p>Training module has been designed for the participants to</p> <ul style="list-style-type: none"> <li>• Understand various types welding processes.</li> <li>• Understand various welding electrodes.</li> <li>• Understand Arc &amp; Gas welding processes.</li> <li>• Understand TIG &amp; MIG welding processes.</li> <li>• Identify the different welding defects.</li> <li>• Appreciate the safety practices used in welding.</li> </ul>
Course Outcomes	<p>At the end of training, the participants will be able to</p> <ul style="list-style-type: none"> <li>• Fabricate types of joints by Arc welding.</li> <li>• Fabricate types of joints by Gas welding.</li> <li>• Fabricate types of joints by MIG welding.</li> <li>• Perform plasma cutting.</li> </ul>
Expected Job Roles	<ul style="list-style-type: none"> <li>• TIG/MIG welder</li> <li>• Arc welder</li> <li>• Gas welder</li> <li>• Plasma cutter</li> </ul>

<b>TEACHING AND SCHEME OF EXAMINATION</b>						
Course Code	Course Name	Hours		Assessment Marks		Duration of the Examination
				Min	Max	
ME/2020/028	<b>HITECH WELDING</b>	Theory	130	10	20	3 hours
		Practical	300	40	80	
		Total	430	50	100	

**ME/2020/028 - HITECH WELDING**  
**DETAILED SYLLABUS**

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	Introduction	25 Hours	
1.1	Shaping of Metals – forging – moulding – cutting – joining. Metal joining metals – riveting – bolting – seaming – brazing – soldering – welding.	25	
1.2	Classification of welding process – practical application of welding – commonly weld base method – advantages disadvantages of welding – welding as compared to riveting and casting.		
1.3	Classification of welding– practical application of welding – advantages and disadvantages of welding – welding as compared to riveting and casting.		
II	Arc welding	180 Hours	
2.1	Physics of welding – introduction – welding arc – arc initiation – types of welding arc – arc stability – metal transfer – heat flow in and around weld metal – metallurgical effects of welding.	50	
2.2	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.		
2.3	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.		
2.4	Joint preparation – preheating – post heating – electrodes, types, specification, coating. Composition of flux – functions of flux – selection of electrodes – welding symbols – welding position.		
2.5	Safety recommendations in welding and cutting – safety in installation and operation of arc welding and cutting equipment – explosion, fire and other hazards – protection of welder.		
2.6	Flux shielding metal arc welding – principle weaving – Arc welding equipments – advantages, limitations, applications of MMAW – Cleaning the base metals, importance, methods.		
2.7	Welding of cast iron – welding of carbon steel, tools steel, stainless steel – welding of aluminium and its alloy – welding of dissimilar metal – metalizing or metal spraying- Submerged arc welding – principle operation, advantages, disadvantages, application.		

2.8	<b>Practical:</b> <ul style="list-style-type: none"> <li>➤ Straight line practice</li> <li>➤ Butt joint</li> <li>➤ Lap joint</li> <li>➤ T joint - Corner joint - T joint – Horizontal, T joint – Vertical, T joint – Overhead.</li> <li>➤ Corner joint – Down hand, Corner joint -Horizontal, Corner joint Vertical.</li> <li>➤ Single V Butt joint – Down hand, Horizontal, Vertical.</li> <li>➤ T joint all position.</li> </ul>		130
<b>III</b>	<b>TIG Welding</b>	<b>50 Hours</b>	
3.1	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	
3.2	<b>Practical:</b> 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.		40
<b>IV</b>	<b>MIG welding and other welding processes</b>	<b>80 Hours</b>	
4.1	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	30	
4.2	Electrodes <b>slag</b> welding – principle, operation, advantages, disadvantages and applications- Electro gas welding – principle, operation, advantages, disadvantages and applications- Plasma arc welding – advantages, disadvantages and applications- Resistance welding – Stud welding – projection welding – butt welding – spot welding – seam welding – advantages, limitations and applications- Atomic hydrogen welding, Thermit welding, laser beam welding, electron beam welding, Hard facing, ultrasonic welding, diffusion and Explosive welding- Difference between D.C Arc welding and AC Arc welding		
4.3	<b>Practical:</b> St. Line practice - Lab joint – Down hand - T joint – Down hand - T joint – Horizontal - Corner joint – Down hand - Single V Butt joint – Down hand- Plasma cutting		50

V	Gas welding and defects in welding	95Hours	
5.1	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.	35	
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	<b>Practical:</b> St. Line practice - Butt joint - Corner joint - T joint.		60
<b>Total Theory and Practical Hours</b>		<b>150</b>	<b>280</b>
<b>Total Hours</b>		<b>430</b>	

#### HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1.	Arc welding unit and accessories
2.	Gas welding unit and accessories
3.	TIG welding unit and accessories
4.	MIG welding unit and accessories
5.	Plasma Unit and 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/2020/028 – HITECH WELDING

(Maximum marks: 20)

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

**20x1=20 Marks**

1. Write any two classification of welding process.
2. Write any two applications of welding.
3. Name any two types of Welding.
4. What are the advantages of welding?
5. What is meant by Riveting?
6. Name any two types of welding arc.
7. What are the functions of electrodes ?
8. Name any two arc welding equipments.
9. Write any two symbols used in welding.
10. What is meant by weaving of arc welding?
11. What is meant by TIG welding?
12. Name any two equipments used in TIG welding.
13. Name any two defects of TIG welding?
14. Write any two causes of TIG welding.
15. Name any two applications of TIG welding.
16. Name any two accessories of MIG welding.
17. What is meant by welding wires of MIG welding?
18. Name any two limitations of seam welding.
19. Write any two operations of electro slag welding.
20. Write any two applications of Resistance welding.
21. Name any two types of gas welding?
22. Name any two types of a flames .
23. What is Leftward technique of gas welding?
24. What is meant by flash back of gas welding?
25. What is meant by back fire of gas welding?