#103

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: WELDING (30 HOURS)

CODE NO.: MVM015 SEMESTER: N/A

PROGRAM: MOTOR YEHICLE TECHNICIAN

AUTHOR: BOB SENECHAL

DATE: 1994-08-22 PREVIOUS OUTLINE DATED: 1993-08-25

APPROVED:

Dean, School of Technical Trades Date

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COURSE NAME: WELDING FOR M.V.T. **COURSE CODE: MVM015**

I. PHILOSOPHY/GOALS:

This course stresses safe handling of oxy-acetylene welding and cutting equipment. In addition to fusion and non-fusion welding practices, students will learn to set-up and practice welding of small diameter pipe.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course, the student will:

. have basic knowledge of welding equipment and welding principles as related to the trade and will know how to use equipment safely

III. TOPICS TO BE COVERED:

See Learning Activities.

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IV. **LEARNING ACTIVITIES:**

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
T-THEORY L-LAB			
1a	**1/2T**	**Orientation to program**	I.A.S.#1
b		**Introduction to O.A.W.**	
2a	1/2T	Assembling and handling of equipment.	Notes/Demo
b		**Construction of equipment.**	Notes/Demo
c		**Repairs to accessories.**	Demo
d		**Types of oxy-acetylene flames and fuel mixtures.**	I.A.S.#2
e		**Welding terms, positions, joints.**	I.A.S.#3
f		**Filler metals and their selection.**	Notes
g		**Weld faults.**	I.A.S.#4
3	**5L**	**Fusion welding practices of mild steel and pipe welding.**	Demo
4	**2L**	**Non-fusion welding practices**	I.A.S. #6 Notes/Demo
5	**1L**	**Cutting practices**	O.A.W. I.A.S. #7
6	**1/2T**	**Written test.**	

TOTAL HRS. 2T, 8L - 5 WEEKS

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
la	1/2T	Orientation to program. - outline of topics to be covered - method of evaluation - testing modes, dates - shop safety and regulations - personal safety - repair of shop equipment	**I.A.S.#1**
b		Introduction to O.A.W. - Scope: fusion, non-fusion, cutting, heating	
2a	1/2T	Assembling and handling of equipment - assemble and disassemble hoses, regulators, torches, tips - identify and change "O" rings - adjust goggles, strikers - transport welding cylinders and cart	Notes/Demo.
b		Construction of equipment. - study cross-section of cylinders - location of safety devices - identification and marking of cylinders	Notes/Demo
c		Repairs to accessories. - hose splicing, crimping tools, hose diameters	Demo
d		Types of O.A. flames and fuel mixtures. - lighting torches and adjustment - flame type and effect on weld puddle characteristics and uses of other fuel gases: Mapp, natural gas, propane, air-acetylene - welding and cutting on containers	I.A.S.#2 Notes/Demo
e		Welding terms, positions, joints. - 3 types of welds: bead, groove and fillet - explanation of face, root, throat of weld - 5 types of joints: butt, lap, tee, corner, edge - weld positions in respect to fillet - explanation of joint penetration and fusion	I.A.S.#3 welds

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
		T-THEORY L-LAB	
f		Filler metals and their selection. - RG45, RG60 - tensile strength, ductility - weld soundness in respect to SI content	Notes
		Weld faults: identification and prevention. - appearance, overlap, undercut, lack of fusion, brittle welds, porosity, excessive convexity, concavity.	**I.A.S.#4** Notes
	5L	Fusion welding practices, 16 gauge metal. - beads, no rod and with rod - edge joint without rod - outside corner joint, with joint - butt joint with rod - lap joint with rod Welding of small diameter pipe - ASTM welding procedure	Demo I.A.S.#5
	2L	Non-fusion welding practices, -braze welding: definition, uses - advantages and disadvantages - braze weld tee-joint (both sides) - braze tee-joint 16 gauge metal using Allstate #45 (RBAg-1)	I.A.S.#6 Notes/Demo
	1L	Cutting practices: scope. - manual straight line cutting with and without guide bar - bevel cutting, mitre cutting - piercing - cutting of round stock; pipe, structural bar - gouging	O.A.W. I.A.S.#7
	1/2T	Written test.	

TOTAL HR. 2T.8L - 5 WEEKS

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
la		introduction to program. Scope of **SMAW.**	
b	1/2T	Personal and shop safety.	SMAW I.A.S.#1
		Maintenance of shop and accessories.	
2a	1/2T	Types of welding machines.	SMAW
b		Current adjustments.	I.A.S.#2 Demo
3	1/2T	Electrical principles.	SMAW I.A.S.#3
4	5L	Welding practices.	SMAW **I.A.S.#4** Demo
	1/2T	Selection of filler metals.	SMAW I.A.S.#5
6		Welding terms and definitions.	SMAW I.A.S.#6
7	1/2T	Weld faults.	SMAW I.AS.#7
8	1/2T	Written test.	

TOTAL HRS. 3T, 5L - 5 WEEKS

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
Ia	1/2T	Introduction to program. - objectives of course - assessment Scope of arc welding. - manual, semi-automatic, automatic processes	
b		Personal and shop safety. - clothing, gloves, helmet, lenses - electrical hazards - importance of electrical connections	SMAW I.A.S.#1
c		Maintenance of shop and accessories. - care of booth, positioners, table - clean-up - care of holder, helmets, gloves - electrode use and storage - material use and storage	
2a		Types of welding machines. - transformer - transformer/rectifier - generator - cost, maintenance of machines - advantages and disadvantages	SMAW I.A.S.#2 Demo
b	1/2T	Current adjustments. - coarse and fine adjustments - standard and remote - current and polarity - concept of polarity - quick disconnect couplers	
3	1/2T	Electrical principles. - copy the face plate of a welding machine; input, output, phase - definition of ampere, volt, ohm, duty cycle, **OCV**	SMAW I.A.S.#3

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
		T-THEORY L-LAB	
4a	5L	Welding practices. beads: 1/8 E6011; AC 1/8 E6013; AC 3/32 E7024; AC 1/8 E7018; DC+; AC	SMAW **I.A.S.#4**
b		beads (Pad): 1/4 plate 3" X 6" 1/8 E6011 - flat position - 1 plate 1/8 E7024 - flat position 1/8 E7018 - flat & horizontal	
c		i) lap joint E7018 - E7024 fillet weld to size ii) outside corner E6011 - E7018 iii) tee joint; IF E7018 - E7024	
d		iv) tee joint, horizontal and vertical single pass and multipass welds for more advanced students	
5	1/2T	Selection of filler metals. - AWS; CSA classification - imperial and metric sizes - operating characteristics of **E6011, E6011, E6013, E7024, E7018** - mechanical properties of above rods	SMAW I.A.S.#5
6		Welding terms and definitions. - fillet weld terms - groove weld terms - layers and passes - weld sizes, shapes - types of welds and joints	SMAW I.A.S.#6
7	1/2T	Weld faults. - overlap, undercut - lack of fusion and penetration - porosity, external and internal - underbead cracking - arc blow - prevention of distortion and weld procedures	SMAW I.A.S.#7
8	1/2T	Written test.	

TOTAL HRS. 3T, 5L - 5 WEEKS

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V. EVALUATION METHODS: (Includes Assignments, Attendance Requirements, etc.)

A = 85% - 100%	1 Theory Test	30%
B = 75% - **84%**	Skill Evaluation	60%
C = 60% - **74%**	Attendance/Attitude -	10%
D = 50% - 59%	TOTAL	100%

The instructor will determine which practical exercises will be used for grading

VI. REQUIRED STUDENT RESOURCES:

Basic Oxy-Acet. Welding Module
S.M.A.W. Basic Welding Module

VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:

VIII. SPECIAL NOTES:

Attendance to all classes is mandatory and will be recorded on an hour by hour basis using the 'Record of Attendance' form.