

LESSON PLAN

Date _____

Trade:- Welder

Name _____

Week No:- Four

Subject :- Basic electricity to applicable in Arc welding and related electric terms and definitions. Heat and temperature and its term related to welding. Principle of arc welding and characteristics of arc.

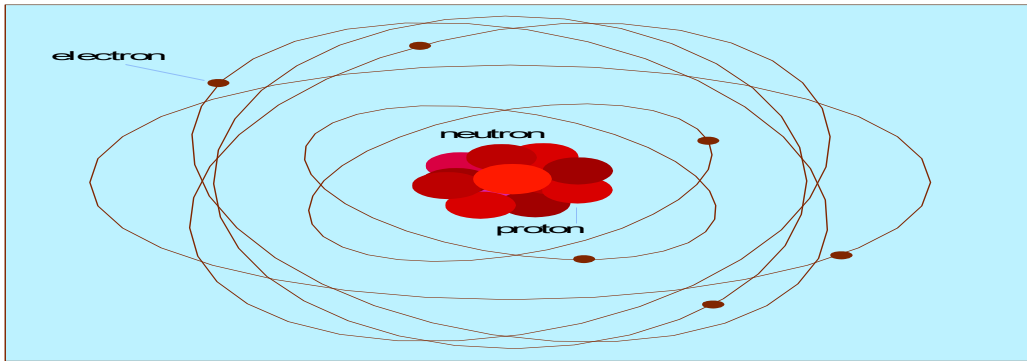
Motivations:-

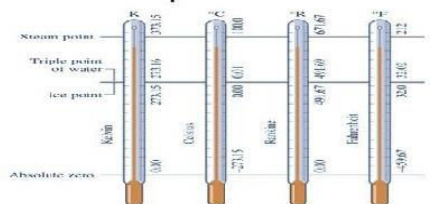
in previous week we learned about Different process of metal joining, bolting, riveting, soldering, brazing and seaming. Types of welding joint and its applications, edge preparation and fit up for different thickness. Surface cleaning.

PREPARATION:- Teaching Aids:-Chalk ,Charts,

INTRODUCTION:- Electricity have a very important role in arc welding. In arc welding electric energy convert into heat energy. Here some basic electric terms define below.

PRESENTATION:-

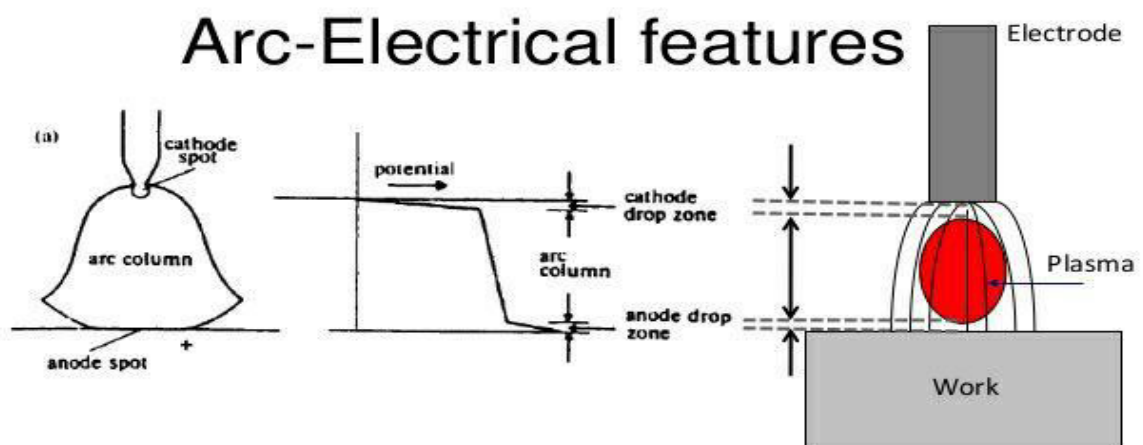
Topic	Information Point	Spot Hint
Electricity	<p>Electricity is generated from the motion of tiny charged atomic particles called electrons and protons!</p>  <p>Protons = + Electrons = -</p>	
Effects of electricity	<ol style="list-style-type: none"> 1. Magnetic effects 2. Heating effects. 3. Chemical effects. 4. Emission of electrons. 5. Contraction of muscles. 	
Types of electricity	<ol style="list-style-type: none"> 1. Static electricity. 2. Current electricity. 	
Current	Flow of electrons	
EMF	Electro motive force. Generate current and measured in volts.	
Conductor	Metals or non metals which have circuit to flow electrons, called conductor.	

Insulator	To avoid flow of electrons.										
DC	Direct current										
AC	Alternating current										
Frequency	AC currents continue change direction positive to negative many times in a second. The rate of cycles called frequency.										
Voltmeter	To measure volt										
Ammeter	To measure ampere.										
Generator	To convert mechanical energy into electric energy.										
Motor	To convert electric energy to mechanical energy.										
Electric circuit	1. Series circuit. 2. Parallel circuit.										
Switch	Use for connect/disconnect electric circuit. Types:- Ordinary switch, iron clad switch, oil break switch and remote control switch.										
Principle of Arc welding	<ul style="list-style-type: none"> • A suitable gap is kept between the work and electrode • A high current is passed through the circuit. • The electric energy is converted into heat energy, producing a temperature of 3000°C to 4000°C. • This heat melts the edges to be welded and molten pool is formed. • On solidification the welding joint is obtained 										
Heat and temp. related to welding	<ul style="list-style-type: none"> • The metric unit for measuring heat is the joule. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Unit</th> <th>Is Equal To</th> </tr> </thead> <tbody> <tr> <td>1 calorie</td> <td>4.186 joules</td> </tr> <tr> <td>1 kilocalorie</td> <td>1,000 calories</td> </tr> <tr> <td>1 Btu</td> <td>1055 joules</td> </tr> <tr> <td>1 Btu</td> <td>252 calories</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • This is the same joule used to measure all forms of energy, not just heat. <p style="text-align: center;">Temperature Scales</p> <p>► Kelvin scale: An absolute thermodynamic temperature scale whose unit of temperature is the kelvin (K); an SI base unit for temperature.</p> <p>► Rankine scale: An absolute thermodynamic temperature scale with absolute zero that coincides with the absolute zero of the Kelvin scale; an English base unit for temperature.</p> <p style="text-align: center;">$T(^{\circ}\text{R}) = 1.8T(\text{K})$ (Eq. 1.16)</p> <p>► Celsius scale ($^{\circ}\text{C}$):</p> <p style="text-align: center;">$T(^{\circ}\text{C}) = T(\text{K}) - 273.15$ (Eq. 1.17)</p> <p>► Fahrenheit scale ($^{\circ}\text{F}$):</p> <p style="text-align: center;">$T(^{\circ}\text{F}) = T(^{\circ}\text{R}) - 459.67$ (Eq. 1.18)</p> 	Unit	Is Equal To	1 calorie	4.186 joules	1 kilocalorie	1,000 calories	1 Btu	1055 joules	1 Btu	252 calories
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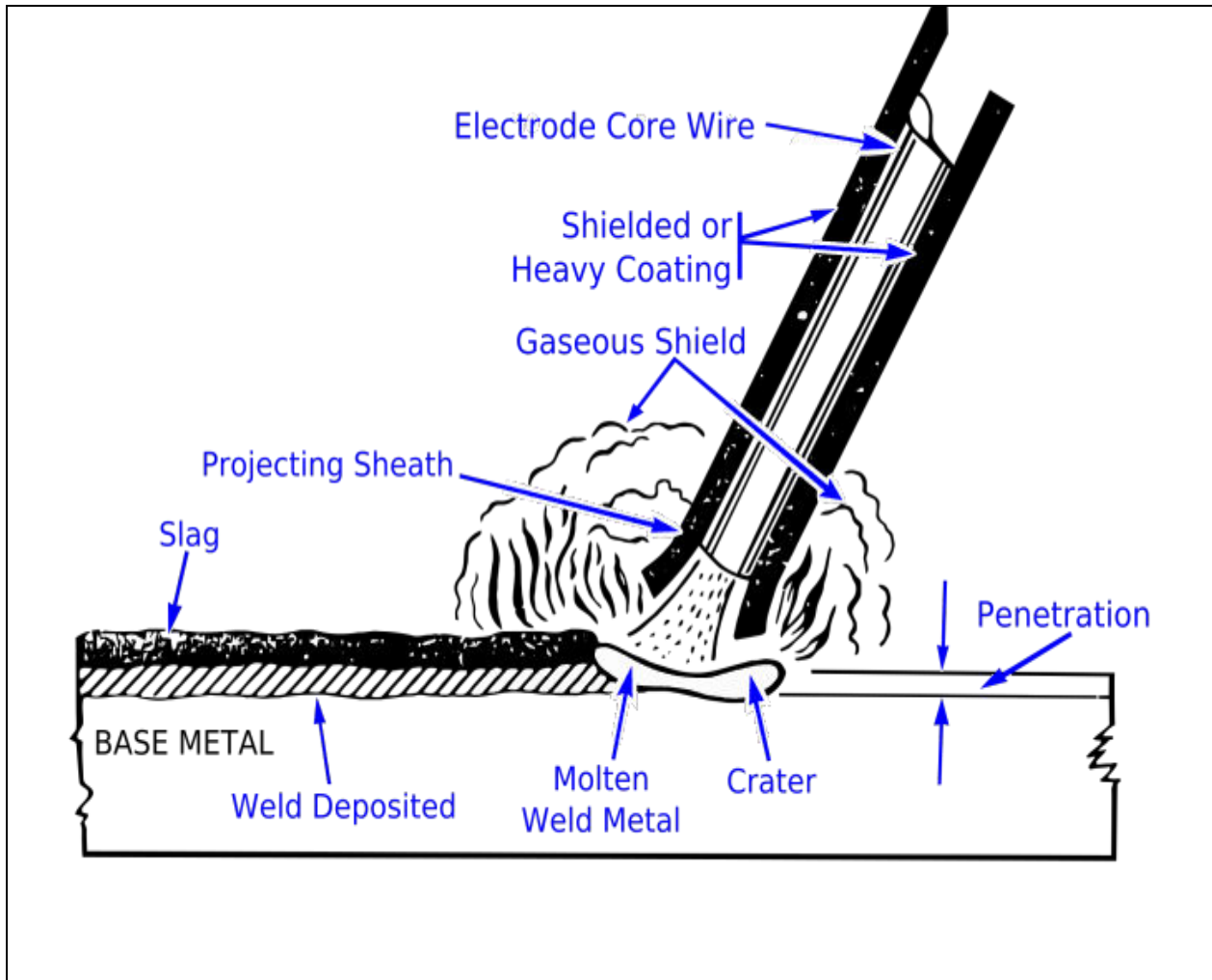
Heat	Temperature
It is the form of energy	It is a thermal condition of body.
It flows from one body to other.	It is a quantity that indicates whether or not and in which direction heat will flow.
It is a total amount of internal energy of a body	It is proportional to average kinetic energy of the molecules of a body.
In the transmission of heat total amount of heat remain unchanged	In the transmission of heat temperature does not remain same.
It is an cause	It is an effect
It SI unit is Joule	It SI unit is Kelvin (K)

- Thermal expansion is defined **as the change in dimensions of a body accompanying a change in temperature.**
- 3 types of thermal expansion :
 - Linear expansion
 - Area expansion
 - Volume expansion
- In **solid**, all types of thermal expansion are occurred.
- In **liquid and gas**, only **volume expansion** is occurred.
- At the same temperature, the gas expands greater than liquid and solid.

Characteristics of Arc



- All electric arcs consist of three regions
 - the cathode fall space (or drop zone);
 - the plasma column fall space (or drop zone)
 - the anode fall space (or drop zone)



Questions:-

1. What is electricity and how many types of electricity?
2. What is ammeter and voltmeter?
3. What is heat expansion and how many type this?

Next week:- common gases use for welding and cutting. Flame temperature and uses.

Chemistry of oxy-acetylene flame. Types of oxy-acetylene flame and uses.

oxy-acetylene cutting equipments, parameters and applications.

Assignments:-

Basic electricity to applicable in Arc welding and related electric terms and definitions.

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Checked by.....

Instructor.....