Multi-State Advanced Manufacturing Consortium

US DOL SPONSORED TAACCCT GRANT: TC23767

MSAMC Master Performance Based Objectives (PBO) Review Template

Instructions

The following tab lists PBOs for the topic area ***Industrial Electricity*** . Please review each of the PBOs, and rate each PBO with one of the following ratings:

1 = Skill or understanding is required for employees.

2 = Skill is useful, but is not crucial for employees.

3 = Skill is not useful for employees, or isn't relevant for typical work assignments.

0 = PBO is unclear.

Additionally, for each PBO, note any comments or recommendations that you may have about how to improve the PBO. If any PBOs or skill sets seem to be missing from the list, please add them in the space at the bottom of the list.

Please enter your information below	
Name:	
Company/Plant:	
Department/Division:	
Industry/Segment:	
Email:	
Phone:	

Industrial Electricity

M-S AMC Industry Partner PBO Review

Please review the following PBOs to identify the appropriate skill set for a given job title / category / classification (see row 10 below).

* In the "**Importance**" column, identify how important each PBO is for someone in the relevant position. For each PBO, type 1 if the PBO must be covered in the coursework, enter 2 if the PBO is helpful but not necessary and would not impair the performance of the employee in the workplace if missed, and enter 3 if the PBO would not benefit the student or doesn't apply to the typical work assignments. If you don't understand the PBO, enter 0.

* Note any comments or feedback for improving each PBO (in the "Comments" column).

Note: It is the intention of competency based instruction to have each student individually demonstrate their proficiency of the skills indicated.

Reviewing PBOs fc ***TYPE JOB TITLE HERE*** (from whose perspective are you rating PBO importance?)

Sub-Topic	Level	Topic	PBO ID	Performance Based Objective (PBO)	Importance 1 = Need 2 = nice to have 3 = N/A 0= Don't understand	Comments *Notes to improve the PBO, PBO is unclear, etc.*
	1	ET	1	Safely work with electricity and electrical components.		
	1	ET	36	Match a list of the kinds of personal protection equipment to their proper description.		
	1	ET	37	Identify the level of current that poses a serious life-threatening condition to the human body.		
	1	ET	2	Match a list of safety practices to the electrical hazards they prevent.		
	1	ET	3	Match a list of the fundamental ways of generating electricity with examples of each.		
	1	ET	4	Use scientific notation to represent mathematical quantities.		
	1	ET	5	Demonstrate the ability to represent a given quantity using the following prefixes: milli, micro, nano, pico, kilo, meg, giga, and tera.		
	1	ET	6	Match the following list of electrical terms to their proper definition: - Volt - Ampere - Ohm - Conductance - Resistance - Insulator - Resistor - Open - Short - Coulomb		
	1	ET	7	Match a list of fuses and circuit breakers to their proper descriptions.		
	1	ET	8	Match wire samples to a list of their proper size and description.		
	1	ET	9	List the factors that determine the current capacity of a wire conductor.		
	1	ET	10	Determine the resistance values of color banded Carbon resistors through the interpretation of the bands and verify their results through the use of a digital or an analog ohmmeter.		

	1	**ET**	**11**	Demonstrate proficiency in the use of the following test equipment: - Digital multi-meter - Analog multi-meter - Clamp-on meter - Meg-ohmmeter - Oscilloscope		
	1	**ET**	**12**	Given a 10VDC supply and a 10K ohm resistor, calculate the current flow in the circuit, construct, and verify with the use of an ammeter.		
	1	**ET**	**13**	Construct, and debug a series circuit containing 3 resistors and a 10VDC supply. Using Ohm's Law and Kirchhoff's Law, calculate the total current flowing in the circuit, the total resistance of the circuit, the voltage drop across each resistor, and the power requirement for each resistor. Then verify all calculations with the use of a multi-meter.		
	1	**ET**	**14**	Construct, and debug a parallel circuit containing 3 resistors and a 10VDC supply. Using Ohm's Law, Kirchhoff's Law, and the Parallel Resistance formula, calculate the total current flowing in the circuit, the total resistance of the circuit, the current flow through each resistor, and the power requirement for each resistor. Then verify all calculations with the use of a multi-meter.		
	1	**ET**	**15**	Given a circuit containing (3) series resistors and a 20VDC supply, determine what will happen to all voltages and currents and the total resistance if any one of the resistors is shorted or opened. Design, construct, and debug the circuit, and verify all calculations with a multi-meter.		
	1	**ET**	**16**	Match standardized symbols used in schematic diagrams to their proper electronic components.		
	1	**ET**	**17**	Using schematic diagrams construct and debug various electrical resistive circuits.		
	1	**ET**	**18**	Construct an electromagnet using a battery, a coil of wire, and a ferromagnetic core. Estimate and verify what will happen to the strength of magnetic field when the number of turns is increased and verify in lab.		
	1	**ET**	**19**	Demonstrate the induction method of generating a voltage using a coil of wire and a permanent magnet, then estimate and verify using a multi-meter or oscilloscope. What will happen if: - The number of turns is increased? - The strength of the magnet is increased?		
	1	**ET**	**20**	Given a graphical representation of an AC sine wave, calculate the Peak to Peak voltage, Peak voltage, RMS voltage, Average voltage, Period, and the Frequency, when some of the values are given.		
	1	**ET**	**21**	Setup the scope to take measurements from a starting condition of all adjustments fully counterclockwise, all switch positions in the center, left position if only a 2-position switch, and all pushbuttons out.		

	1	**ET**	**22**	Construct, and debug a circuit with 2 resistors in series and an AC source of 10 to 20VAC. Calculate the voltage drop across each resistor and verify with a multi-meter. Also, verify with an oscilloscope and compare the two measurements.	
	1	**ET**	**23**	Using the Reactance Formula, determine the Inductive Reactance of an Inductor in an electrical AC circuit.	
	1	**ET**	**24**	Using the Reactance Formula, determine the Capacitive Reactance of a Capacitor in an electrical AC circuit.	
	1	**ET**	**25**	Construct, and debug series and parallel Inductive AC circuits. Use an oscilloscope to measure and analyze the waveforms. Calculate all voltages, currents, powers, and phase angles for the circuit. Verify all voltage, current and phase angle calculations through the proper use of meters and scopes.	
	1	**ET**	**26**	Construct, and debug series and parallel Capacitive AC circuits. Use an oscilloscope to measure and analyze the waveforms. Calculate all voltages, currents, powers and phase angles for the circuit. Verify all voltage, current and phase angle calculations through the proper use of meters and scopes.	
	1	**ET**	**27**	Given values of inductors and resistors, calculate the LR time constant. Construct an inductive/resistive electrical circuit and verify results.	
	1	**ET**	**28**	Given values of capacitors and resistors, calculate the RC time constant. Construct a capacitive/resistive electrical circuit and verify results.	
	1	**ET**	**29**	Construct and debug a series/parallel electrical circuit. Apply Thevenin's theorem to simplify the circuit for analysis. Verify the results through practical substitution and measurement.	
	1	**ET**	**30**	Construct and debug series/parallel Inductive/Capacitive/Resistive AC circuits. Use an oscilloscope to measure and analyze the sinusoidal waveforms, calculate and then measure the voltage and current values of the sine waves. Measure the phase angle between the applied voltage and the total current.	
	1	**ET**	**31**	Use a continuity checker and an ohmmeter to verify the normally open and normally closed set of contacts on a switch.	
	1	**ET**	**32**	Using live electrical circuits, make voltage measurements with respect to ground.	
	1	**ET**	**33**	Use a voltmeter to determine the state of a switch (open or closed) in a circuit under power. Additionally, predict and verify with an ammeter whether current is flowing.	
	1	**ET**	**34**	Given a switch, a DC relay, DC power source, light bulb, and AC power source, determine the N/O contacts of the relay and construct a circuit where the DC switching circuit controls the AC power to the light bulb.	

	1	ET	35	Given a schematic, construct and debug an electrical circuit used for the purpose of troubleshooting. Demonstrate fault finding skills with the use of multi-meters to locate shorted and open circuits, induced by the Instructor.		
	1	ET	38	Match a list of terms for transformers to their proper description.		
	1	ET	39	Given primary voltage and current, use the known turns ratio to calculate the transformer's secondary terminal voltage and current.		
	1	ET	41	Match a list of the following tests performed on transformers to their proper description: - Polarity test - Insulation resistance test - Excitation and Power factor test - Impedance measurement - Winding resistance and short circuit test - Thermal test - Tap change - Frequency response - Loading, off loading		

Additions: Please add any additional objectives that we may have overlooked.

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