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 areas *AC/DC Motors, Drives, and Controls*.   Please review each of the PBOs, and rate each PBO with one of the following ratings:

1 = Skill or understanding is required for students.

2 = Skill is useful, but is not crucial for students to know.

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

0 = PBO is unclear.

Additionally, for each PBO please

* Note any comments or recommendations that you may have about how to improve the PBO.

* Indicate whether each PBO is covered in your college's aligned courses, and how (written, lab demo, exercise).

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:	
Institution:	
Date:	
Email:	
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Please enter your information below

Name:	
Institution:	
Date:	
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Please indicate which course or courses delivered at your institution align with, or cover, the listed objectiv

Aligned Course(s)	1	Enter course code here
	2	Enter course code here
	3	Enter course code here

* Note: For each covered PBO, indicate in which of the aligned courses, documented at left, the PBO would be most extensively covered. If there is only one course listed to the left, then you do not have to complete the "Aligned Course" column.

Sub-Topic	Level	Topic	PBO ID	Performance Based Objective (PBO)	Importance, 1 = Need 2 = Nice to have 3 = N/A 0 = Don't understand	Covered - Written Assignment / Reading? Y/N	Covered - Exercise or Assessment? Y/N	Aligned Course *	Comments *Notes to improve the PBO, PBO is unclear, lacking equipment to cover, etc.*
	1	MD	1	Calculate total current, total resistance and individual voltages and currents of series and parallel circuits. Construct, measure and verify calculations related to the following: - Voltage, Current and Resistance - Ohm's Law - Power Calculations - Series and Parallel circuits					
	1	MD	2	Demonstrate the proper use of the following tools & test equipment in performing electrical measurements, repairs, and installations. - Hand tools and related safety - Power tools and related safety - Electrical & electronic testers, and meters.					
	1	MD	3	Identify power hazards in lab circuits and describe the proper safety precautions related to the following: - Electrical safety practices used in Industry - NEC - PPE - Lockout/Tag-out - Confined spaces					
	1	MD	4	Demonstrate the use of the following items to navigate, identify, and describe the function of electrical circuits: - Symbols - Electrical diagrams - Schematics - Line diagrams - Applications					
	1	MD	5	With the use of a control diagram, construct and debug circuits using the following items: - Line diagram rules & numbering - Load and control connections - Logic functions (Relay)					
	1	MD	6	Match these DC electrical devices: DC Generators, DC Motors, & Solenoids to a list of their characteristics in the areas of: - Magnetism &Electromagnetism principles - Operating Characteristics - Applications - Connections/wiring					
	1	MD	7	Construct a DC generator circuit. Predict and verify the output changes as related to speed.					
	1	MD	8	Construct a DC Motor control circuit (Relays); demonstrating speed control, starting current control, reversing and braking. Change the configurations (series to shunt to compound) of the DC motor and verify the characteristics of each configuration.					

1	MD	9	Match these AC electrical devices: AC Generators, AC Motors, Transformers, & Solenoids to a list of their characteristics in the following areas: - Single and Three phase AC applications - Magnetism & Electromagnetic principles - Operating Characteristics - Applications - Connections/wiring - Maintenance & Troubleshooting					
1	MD	10	Construct AC single phase and three phase motor circuits and compare the operating speed and currents to the faceplate information.					
1	MD	11	Predict the direction of rotation of a stepper motor when given a drawing of the motor's windings and the polarity of the applied voltage.					
1	MD	12	Match the following AC and DC motor braking methods to their proper description: - Friction Brakes - Plugging - Electrical Braking - Dynamic Braking					
1	MD	13	13) Match the following devices used in motor installations to their proper description: - Line Protection - Filtering Devices - Surge protectors - Disconnects - Contactors & relays - Overloads					
1	MD	14	List and interpret motor nameplate data. (Written exercise using motor nameplates)					
1	MD	15	Match the following Power Distribution items to a list of their proper description: - Transformers and sub-stations - Switch boards and Panel boards - Branch circuits - Motor control centers - Feeders and Bus-ways - Grounding - Fuses and circuit breakers					
1	MD	16	Match these motor controls (switches, relays, contactors, starters, & intelligent devices) to a list describing the following items: - Operating characteristics (including manual operation) - Applications - Connections/wiring - Troubleshooting					
1	MD	26	Match the following reduced-voltage starting circuits to their proper description: - Reduced-voltage starting method comparison - Solid-state switching & starting - DC motor reduced-voltage starting - Reduced-voltage starting for three-phase induction motors - Primary resistor starting - Autotransformer starting - Part-winding starting - Wye-Delta starting - Troubleshooting					
1	MD	27	Match the following motor reversing methods and control schemes to their proper description: - Reverse motors using manual starters - Reverse motors using drum switches - Reverse motors using magnetic motor starters - PLC control - Magnetic reversing starter applications - Wiring methods - Troubleshooting					
1	MD	28	Construct a three phase motor starter control that can reverse the direction of rotation. Document the circuit through the generation of an appropriate diagram. Must apply overloads and conventional start/stop circuitry.					
1	MD	18	Demonstrate Electrostatic Discharge prevention while working with drive components.					
1	MD	19	Demonstrate Motor Drive Pre-Power and Power-On checks.					

1	MD	20	Navigate Motor Drive Control operator interfaces, software, and menus.					
1	MD	21	Demonstrate the Upload & Download procedures of Motor Drive parameters.					
1	MD	22	Monitor and edit drive parameters of a VFD to affect the motor's operation.					
1	MD	23	Write a description of the motor regeneration principle.					
1	MD	24	Describe the relationship between an AC motors amount of slippage and expected current under varying load conditions.					
1	MD	25	Identify & match NEMA classification ratings of motors to name plate information.					
1	MD	29	Match the following Timing and Counting items to their proper description. - Timers - Counters - Wiring - Applications - Troubleshooting					
1	MD	30	Given an output timing diagram, develop a control circuit to achieve the desired output, construct and debug the circuit.					
1	MD	31	Match the following Sensing devices to a list of their proper descriptions. - Photoelectric (types include retro-reflective, Transmitter/Receiver, etc.) - Ultrasonic - Proximity (including Magnetic and RF) - Safety devices (e.g. light screens, scanners, mats, etc.) - Indicators - Capacitive switches, etc.					
1	MD	32	Given a circuit description containing several differing sensors for inputs and a sequence chart for the outputs, develop a control circuit to achieve the desired output, construct and debug the circuit. Document the circuit through the generation of an appropriate diagram.					
1	MD	34	Using diagnostic LEDs and Fault Codes on a motor drive, select the appropriate corrective action.					
1	MD	35	Program a variable frequency drive to control the speed, acceleration and deceleration of an induction motor. Write a program to start, stop, and reverse the motor.					

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

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