



Level One

MODULE 32101 – ELECTRICAL SAFETY

Task Number	Item	Date(s)	Recorded By
32101-1	Perform a visual inspection and an air test on rubber gloves.		
32101-2	Perform a hazard assessment of a job such as replacing the lights in your classroom. <ul style="list-style-type: none">• Discuss the work to be performed and the hazards involved.• Locate the closest phone to the work site and ensure that the local emergency telephone numbers are either posted at the phone or known by you and your partner(s).• Plan an escape route from the location in the event of an accident.		

MODULE 32102 – HAND BENDING

Task Number	Item	Date(s)	Recorded By
32102-1	Given a piece of EMT, complete the following using a hand bender, hacksaw, and reaming tool. No couplings are allowed, and there should be no kinks in the pipe. <ul style="list-style-type: none">• Offset• Saddle• 90° stub-up with a kick		

MODULE 32103 – FASTENERS AND ANCHORS

Task Number	Item	Date(s)	Recorded By
32103-1	Install selected threaded fasteners.		
32103-2	Install blind rivets.		
32103-3	Install selected screws.		
32103-4	Install selected anchors.		
32103-5	Install selected toggle bolts.		

MODULE 32104 – ELECTRICAL THEORY ONE

Task Number	Item	Date(s)	Recorded By
32104-1	Use the formula for Ohm's Law to calculate unknown values for current, resistance, and voltage.		
32104-2	Given different resistors, identify the correct resistance value and tolerance using the color code.		
32104-3	Draw basic voltmeter and ohmmeter circuits and explain how they operate.		
32104-4	Use the power formula to calculate the amount of power used by a circuit.		
32104-5	Use a variation of the power formula to calculate the maximum current a resistor can carry based on the resistor's value and power rating.		

MODULE 32105 – ELECTRICAL THEORY TWO

Task Number	Item	Date(s)	Recorded By
32105-1	Calculate the total resistance for selected series, parallel, and series-parallel circuits.		
32105-2	Use Kirchoff's Current Law to calculate the total and unknown currents in parallel and series-parallel circuits.		
32105-3	Use Kirchoff's Voltage Law to calculate voltage drops in series, parallel, and series-parallel circuits.		

MODULE 32106 – ELECTRICAL TEST EQUIPMENT

Task Number	Item	Date(s)	Recorded By
32106-1	Under the supervision of the instructor, connect a multimeter to a circuit and measure the source voltage.		
32106-2	Under the supervision of the instructor, demonstrate the procedure for safely using a clamp-on ammeter.		
32106-3	Under the supervision of the instructor, demonstrate the procedure for safely using a voltage tester.		

MODULE 32107 – INTRODUCTION TO THE NEC®

Task Number	Item	Date(s)	Recorded By
32107-1	Use NEC Article 90 to determine the scope of the NEC®. State what is covered by the NEC® and what is not.		
32107-2	Find the definition of the term feeder in the NEC®.		
32107-3	Look up the NEC® specifications that you would need to follow if you were installing an outlet near a swimming pool.		
32107-4	Find the minimum wire bending space required if two No. 1/0 AWG conductors were to be installed in a junction box or cabinet.		

MODULE 32108 - CONDUCTORS

Task Number	Item	Date(s)	Recorded By
32108-1	Perform a manual single cable pull: <ul style="list-style-type: none">• Select the proper pulling rope for the pull.• Attach the pulling rope to the cable.• Attach the pulling rope to the puller.• Pull the cable through the conduit.		
32108-2	Perform the feed: <ul style="list-style-type: none">• Make a pulling head attachment.• Apply lubricant to the cable as it is being pulled.• Seal the end of the cable after the pull is complete.		

MODULE 32109 – INTRODUCTION TO ELECTRICAL BLUEPRINTS

Task Number	Item	Date(s)	Recorded By
32109-1	Using Sheet 2 of Transparency 2-1, make a material takeoff of the lighting fixtures specified in the table shown on the next page. The takeoff requires that all lighting fixtures be counted, and where applicable, the total number of lamps for each fixture type must be calculated.		
32109-2	Demonstrate the use of an architect's scale.		

MODULE 32110 – OXYFUEL CUTTING

Task Number	Item	Date(s)	Recorded By
32110-1	Set up oxyfuel equipment.		
32110-2	Light and adjust an oxyfuel torch.		
32110-3	Shut down oxyfuel cutting equipment.		
32110-4	Disassemble oxyfuel equipment.		
32110-5	Change empty cylinders.		
32110-6	Perform straight line and square shape cutting.		
32110-7	Perform piercing and slot cutting.		
32110-8	Perform bevel cutting.		
32110-9	Perform washing.		
32110-10	Perform gouging.		

Level Two

MODULE 32201 – WIRING: COMMERCIAL AND INDUSTRIAL

Task Number	Item	Date(s)	Recorded By
32201-1	Draw single-pole, three-way, and four-way switches as they are connected in typical lighting circuits.		
32201-2	Based on a given set of environmental conditions, select the correct NEMA enclosure for use with a motor controller.		
32201-3	Use a wire stripper to safely remove insulation from a wire.		
32201-4	Use a solderless connector to splice two wires together.		
32201-5	Simulate and/or demonstrate the installation of a receptacle.		

MODULE 32202 – ALTERNATING CURRENT

Task Number	Item	Date(s)	Recorded By
32202-1	Calculate the power factor for the circuit shown in Figure 46.		
32202-2	Given that the inductive reactance is 96Ω , calculate the capacitor value in μF required to make the powerfactor unity for the circuit shown in Figure 46.		

MODULE 32203 – MOTORS: THEORY AND APPLICATION

Task Number	Item	Date(s)	Recorded By
32203-1	Identify various types of motors and their application(s).		
32203-2	Connect the terminals for a high-voltage motor.		
32203-3	Connect the terminals for a low-voltage motor.		

MODULE 32204 - GROUNDING

Task Number	Item	Date(s)	Recorded By
32204-1	Using the proper fittings, connect one end of a No. 4 AWG bare copper grounding wire to a length of 3/4" galvanized water pipe and the other end to the correct terminal in a main panelboard.		
32204-2	Install two lengths of Type NM cable in a switch box using Type NM cable clamps. <ul style="list-style-type: none">• Strip the ends of the cable to conform with NEC® requirements.• Secure the cable in the switch box and tighten the cable clamps.• Connect and secure the equipment grounding conductors according to NEC® requirements and secure to the switch box with either a ground clip or a grounding screw.		

MODULE 32205 – BOXES AND FITTINGS

Task Number	Item	Date(s)	Recorded By
32205-1	Install selected conduit bodies.		
32205-2	Install selected fittings in a raceway system.		
32205-3	Calculate the outlet box capacities for various wiring configurations.		

MODULE 32206 – CABLE TRAY

Task Number	Item	Date(s)	Recorded By
32206-1	Generate a list of materials for a cable tray layout. List all the components required, including the fasteners required to complete the system.		
32206-2	Join two straight, ladder-type cable tray sections together.		
32206-3	Fabricate a 30° offset for a cable tray.		

MODULE 32207 – CONDUCTOR TERMINATIONS AND SPLICES

Task Number	Item	Date(s)	Recorded By
32207-1	Install heat-shrink insulators onto selected terminals.		
32207-2	Strip wires and make splices using wire nuts.		
32207-3	Terminate wires and cables using selected crimp-type and mechanical-type terminals and connectors.		
32207-4	Properly train cables using ratchet and hydraulic benders.		
32207-5	Tape selected types of wire splices and/or install a motor connection kit.		

MODULE 32208 – INSTALLATION OF ELECTRIC SERVICES

Task Number	Item	Date(s)	Recorded By
32208-1	Install a service head on a piece of 4/0 aluminum cable, allowing enough conductor for a drip loop.		
32208-2	Insert single-pole and double-pole circuit breakers in a panelboard.		

MODULE 32209 – CIRCUIT BREAKERS AND FUSES

Task Number	Item	Date(s)	Recorded By
32209-1	Disassemble a renewable fuse and replace the link.		
32209-2	Calculate the short circuit current for a sample fault.		

MODULE 32210 – CONTACTORS AND RELAYS

Task Number	Item	Date(s)	Recorded By
32210-1	Mount and connect a 120V lighting contactor with a three-wire pushbutton control.		

MODULE 32211 - LUBRICATION

Task Number	Item	Date(s)	Recorded By
32211-1	Read and interpret an MSDS.		
32211-2	Identify and use lubrication equipment to apply lubricants.		
32211-3	Read and interpret a lubrication chart.		

MODULE 32212 – INTRODUCTION TO BEARINGS

Task Number	Item	Date(s)	Recorded By
32212-1	Identify various types of bearings.		
32212-2	Identify parts of bearings: <ul style="list-style-type: none">• outer race• inner race• rollers/balls• retainer		
32212-3	Explain bearing designation numbers per manufacturer's specifications.		

MODULE 32213 – COPPER AND PLASTIC PIPING PRACTICES

Task Number	Item	Date(s)	Recorded By
32213-1	Correctly measure the diameter of copper tubing.		
32213-2	Cut and ream copper tubing using a tubing cutter.		
32213-3	Correctly bend copper tubing using bending tools.		
32213-4	Make a swage joint in a section of copper tubing.		
32213-5	Make and join single and double-thickness flare connections.		
32213-6	Join two sections of tubing using a compressing fitting.		
32213-7	Cut and join two sections of plastic pipe using appropriate fittings.		

MODULE 32214 – FERROUS METAL PIPING PRACTICES

Task Number	Item	Date(s)	Recorded By
32214-1	Identify types of carbon steel pipe.		
32214-2	Identify pipe sizes and weights.		
32214-3	Identify the various pipe fittings.		
32214-4	Use five methods for measuring pipe.		
32214-5	Cut and ream carbon steel pipe.		
32214-6	Thread pipe.		
32214-7	Apply pipe dope to pipe threads.		
32214-8	Apply teflon tape to pipe threads.		
32214-9	Join sections of threaded pipe.		
32214-10	Assemble threaded pipe to fittings.		

MODULE 32215 – PIPING SYSTEMS

Task Number	Item	Date(s)	Recorded By
32215-1	Identify the type of piping system designated by a red color-code.		
32215-2	Identify the type of piping system designated by a yellow color-code.		
32215-3	Identify the type of piping system designated by a green color-code.		
32215-4	Identify the type of piping system designated by a bright blue color-code.		
32215-5	Identify the type of piping system designated by a deep purple color-code.		

MODULE 32216 – SMAW - EQUIPMENT AND SETUP

Task Number	Item	Date(s)	Recorded By
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This is a knowledge-based module; there is no performance testing.

Level Three

MODULE 32301 – OVERCURRENT PROTECTION

Task Number	Item	Date(s)	Recorded By
32301-1	Complete the single-line diagram in Transparency 1-2 (Sheet 2 of 2) by filling in the type and size of fuse used for the various applications.		
32301-2	Using several types of fuses and fuseholders, insert the proper fuse in the correct fuseholder.		

MODULE 32302 – DISTRIBUTION EQUIPMENT

Task Number	Item	Date(s)	Recorded By
32302-1	Given the manufacturer's literature for a specific piece of distribution equipment, identify the components, operating characteristics, and applicable NEC® requirements.		

MODULE 32303 – MOTOR CONTROLS

Task Number	Item	Date(s)	Recorded By
32303-1	Make all required connections for an FHP, 120V, single-phase motor starter, including the motor connections.		
32303-2	Make all connections for a magnetic motor controller with two pushbutton stations, including the connections for the holding circuit interlock.		
32303-3	Make the final connections to a 240V motor controller in the circuit shown in Transparency 1-2 (Sheet 2 of 2). The controller will be operated by one pushbutton station (start and stop).		

MODULE 32304 – MOTOR MAINTENANCE, PART ONE

Task Number	Item	Date(s)	Recorded By
32304-1	Using an untagged three-phase motor without a nameplate, determine as many motor characteristics as possible.		
32304-2	Connect the motor leads (in the above motor) for operation on its lower voltage.		
32304-3	Connect the motor leads (same motor) for operation on its higher voltage.		

MODULE 32305 – MOTOR MAINTENANCE, PART TWO

Task Number	Item	Date(s)	Recorded By
32305-1	Perform insulation testing on a defective motor.		
32305-2	Troubleshoot a defective motor.		

MODULE 32306 – INSTALLING COUPLINGS

Task Number	Item	Date(s)	Recorded By
32306-1	Identify and explain types of couplings.		
32306-2	Install couplings, using the press-fit method.		
32306-3	Install split couplings.		
32306-4	Install couplings, using the interference-fit method.		
32306-5	Remove couplings, using mechanical pullers.		
32306-6	Remove couplings, using the hydraulic removal method.		

MODULE 32307 – INSTALLING MECHANICAL SEALS

Task Number	Item	Date(s)	Recorded By
32307-1	Identify and explain types of mechanical seals.		
32307-2	Explain mechanical seal classification.		
32307-3	Safely and accurately remove and inspect mechanical seals.		
32307-4	Safely and accurately install mechanical seals.		

MODULE 32308 – INSTALLING BELT AND CHAIN DRIVES

Task Number	Item	Date(s)	Recorded By
32308-1	Identify and explain belt drive types.		
32308-2	Install belt drives.		
32308-3	Identify and explain chain drive types.		
32308-4	Install chain drives.		

MODULE 32309 – INSTALLING BEARINGS

Task Number	Item	Date(s)	Recorded By
32309-1	Remove bearings.		
32309-2	Identify bearing failures and their causes.		
32309-3	Install bearings.		

MODULE 32310 – GASKETS AND PACKING

Task Number	Item	Date(s)	Recorded By
32310-1	Specifications for the proper gasket material.		
32310-2	Select the proper gasket material.		
32310-3	Spread graphite on the flange face, making sure to cover flange face completely.		
32310-4	Place the gasket material on the flange face and make an impression. Be sure the gasket material lies flat on the flange face.		
32310-5	Lift the gasket material off of the flange face. Do not blur the impression by sliding the gasket on the flange face.		
32310-6	Cut out the gasket using tin snips. Follow the impression exactly.		
32310-7	Place the gasket material on hardwood to protect the punch edge, and then, punch out the holes cleanly using a hole punch.		
32310-8	Clean all of the graphite off of the gasket using the appropriate cleaner.		

MODULE 32311 – INSTALLING SEALS

Task Number	Item	Date(s)	Recorded By
32311-1	Select seals.		
32311-2	Remove and install seals.		

MODULE 32312 - PUMPS

Task Number	Item	Date(s)	Recorded By
32312-1	Identify centrifugal pumps.		
32312-2	Identify rotary pumps.		
32312-3	Identify reciprocating pumps.		
32312-4	Identify metering pumps.		
32312-5	Identify vacuum pumps.		
32312-6	Install pumps.		

MODULE 32313 – BASIC HYDRAULIC SYSTEMS

Task Number	Item	Date(s)	Recorded By
32313-1	Explain Pascal's Law and Bernoulli's Principle. Relate both of these principles to hydraulics.		
32313-2	Explain the four properties of hydraulic fluids.		
32313-3	Explain the difference between a single- and double-acting cylinder.		
32313-4	Describe the classifications of hydraulic pumps.		
32313-5	Explain the function of a hydraulic pump versus the function of a hydraulic gear motor.		

MODULE 32314 – BASIC PNEUMATIC SYSTEMS

Task Number	Item	Date(s)	Recorded By
32314-1	Explain why the compressor multistaging process is used.		
32314-2	Explain how an axial compressor works.		
32314-3	Explain how an in-line filter works.		
32314-4	Describe the three primary pneumatic system components.		

MODULE 32315 – BASIC ELECTRONIC THEORY

Task Number	Item	Date(s)	Recorded By
32315-1	Identify the collector, base, and emitter on no fewer than three different types of NPN transistors.		
32315-2	Identify the collector, base, and emitter on no fewer than three different types of PNP transistors.		
32315-3	Identify the cathode on three different styles of SCRs, using the shape or markings for identification.		
32315-4	Identify three different types of SCRs using an ohmmeter.		

Level Four

MODULE 32401 – PRACTICAL APPLICATIONS OF LIGHTING

Task Number	Item	Date(s)	Recorded By
32401-1	Use lighting fixture manufacturers' catalogs to select the appropriate lighting fixtures for specific lighting situations.		
32401-2	While touring selected structures to observe their lighting systems: <ul style="list-style-type: none">• Identify the various types of lighting fixtures being used.• Explain the specific purpose served by the different fixtures.• Identify the lighting system class of service.		

MODULE 32402 – STANDBY AND EMERGENCY SYSTEMS

Task Number	Item	Date(s)	Recorded By
32402-1	Interpret manufacturer's generator set maintenance and service schedules.		
32402-2	Test the charge condition of a lead acid battery by measuring the specific gravity of the electrolyte (sulfuric acid).		
32402-3	Use a low-resistance ohmmeter to measure battery intercell connection resistance.		
32402-4	Use a battery load test unit to load test a battery.		

MODULE 32403 – ADVANCED CONTROLS

Task Number	Item	Date(s)	Recorded By
32403-1	Using a test board, identify and connect various control devices (limit switches, etc.).		
32403-2	Identify various types of motor controls.		

MODULE 32404 – COMMERCIAL AND INDUSTRIAL REFRIGERATION

Task Number	Item	Date(s)	Recorded By
32404-1	Demonstrate and/or describe the general procedure for installing parallel compressors and/or satellite compressors in refrigeration systems.		
32404-2	Demonstrate and/or describe the general procedure for installing packaged condensing units and/or individual air-cooled condensers in refrigeration systems.		
32404-3	Demonstrate and/or describe the general procedure for installing packaged unit coolers and/or individual evaporators in refrigeration systems.		
32404-4	Demonstrate and/or describe the general procedures for installing selected refrigeration system accessories. <ul style="list-style-type: none">• Filters and filter-driers• Sightglass/moisture-liquid indicators• Suction line accumulator• Crankcase heater• Oil separator and oil control systems• Receiver• Manual shutoff and service valves• Relief valves and fusible plugs• Check valves• Compressor muffler• Vibration isolators		
32404-5	Recognize control devices commonly used in refrigeration systems. <ul style="list-style-type: none">• Crankcase pressure regulators• Evaporator pressure regulators• Condenser head pressure regulators• Hot gas bypass regulators• Compressor cylinder unloaders and solenoid-controlled unloaders		
32404-6	Demonstrate and/or describe the general procedure for installing ice making machines.		
32404-7	Demonstrate and/or describe the general procedure for retrofitting a CFC refrigeration system. <ul style="list-style-type: none">• CFC to HCFC using alkylbenzene oil• CFC to HCFC using POE oil• CFC to HFC using POE oil		
32404-8	Recognize basic ammonia refrigeration systems. Compare the components used in ammonia systems with those used in halocarbon-based refrigerant systems.		
32404-9	Demonstrate and/or describe the safety procedures for working with ammonia.		

MODULE 32405 – ELECTRICITY IN HVAC SYSTEMS

Task Number	Item	Date(s)	Recorded By
32405-1	Remove the cover from an electric bimetal thermostat and identify: <ul style="list-style-type: none">• Temperature adjustment controls• Calibration screw• Bimetal element• Anticipating element• Cycling screw• Line contacts		
32405-2	Connect a single-pole, line voltage thermostat to a 500W, 120V electric heater, attach the line side to a cord and plug assembly, plug the unit into a 120V receptacle, and check the thermostat for proper functioning.		

MODULE 32406 – HVAC CONTROLS

Task Number	Item	Date(s)	Recorded By
32406-1	Identify various types of thermostats and explain their operation and uses.		
32406-2	Define the conditions for the proper location of a wall-mounted thermostat.		
32406-3	Install a conventional 24V bimetal thermostat and hook it up using the standard coding system for thermostat wiring.		
32406-4	Check and adjust a thermostat, including the heat anticipator setting and indicator adjustment.		
32406-5	Program an electronic programmable thermostat.		
32406-6	Identify electrical and electronic components and circuits, recognize their diagram symbols, and explain their functions.		
32406-7	Interpret control circuit diagrams.		

MODULE 32407 – CONVENTIONAL ALIGNMENT

Task Number	Item	Date(s)	Recorded By
32407-1	Level and align the driven on a base.		
32407-2	Adjust face alignment, top view.		
32407-3	Adjust OD alignment, top view.		
32407-4	Adjust face alignment, side view.		
32407-5	Adjust OD alignment, side view.		
32407-6	Adjust face and OD alignment, top view.		
32407-7	Adjust face and OD alignment, side view.		
32407-8	Explain the causes of coupling stress.		
32407-9	Check for coupling stress.		
32407-10	Eliminate coupling stress.		
32407-11	Set up dial indicators.		
32407-12	Take top view measurements, using a dial indicator.		
32407-13	Take side view measurements, using a dial indicator.		
32407-14	Take face and OD measurements, using dial indicators.		

MODULE 32408 – MAINTAINING VALVES

Task Number	Item	Date(s)	Recorded By
32408-1	Remove and install threaded valves.		
32408-2	Remove and install flanged valves.		
32408-3	Replace valve stem O-rings.		
32408-4	Replace bonnet gaskets.		
32408-5	Repack a valve.		

MODULE 32409 – IDENTIFYING AND INSTALLING VALVES

Task Number	Item	Date(s)	Recorded By
32409-1	Identify types of valves that start and stop flow.		
32409-2	Identify types of valves that regulate flow.		
32409-3	Identify valves that relieve pressure.		
32409-4	Identify valves that regulate the direction of flow.		
32409-5	Identify types of valve actuators.		
32409-6	Explain how to properly store and handle valves.		
32409-7	Explain valve locations and positions.		
32409-8	Install valves with threaded ends.		
32409-9	Install valves with welded ends.		
32409-10	Install valves with flanged ends.		

MODULE 32410 – STEAM TRAPS

Task Number	Item	Date(s)	Recorded By
32410-1	Identify the different types of steam traps.		
32410-2	Install steam traps.		
32410-3	Identify the specific problems on faulty steam traps.		
32410-4	Identify the proper corrective action required for the faulty steam traps.		

MODULE 32411 – STEAM SYSTEMS

Task Number	Item	Date(s)	Recorded By
32411-1	Demonstrate an awareness of the safety precautions used when working on steam systems.		
32411-2	Recognize the major components of steam heating systems and explain the purpose of each component.		
32411-3	Demonstrate and/or describe the purpose of each operating control and accessory used with steam boilers.		
32411-4	Demonstrate and/or describe how to perform steam boiler and steam system operating procedures: <ul style="list-style-type: none">o Check out procedureso Shutdown procedureso Start-up procedureso Blowdown and skimming procedure		
32411-5	Identify the types of piping distribution systems used with steam systems.		
32411-6	Install steam traps.		
32411-7	Maintain steam traps.		
32411-8	Develop a preventive maintenance checklist for steam systems.		

MODULE 32412 – PROGRAMMABLE LOGIC CONTROLLERS

Task Number	Item	Date(s)	Recorded By
32412-1	Identify the basic components in a PLC system when given a PLC diagram.		
32412-2	Given a ladder logic diagram, point out commonly used symbols and their meaning.		

MODULE 32413 – HIGH-VOLTAGE TERMINATIONS/SPLICES

Task Number	Item	Date(s)	Recorded By
32413-1	Strip the ends of two high-voltage cables.		
32413-2	Install a crimp-type connector to join the two high-voltage cables.		
32413-3	Tape the splice.		

MODULE 32414 – VIBRATION ANALYSIS

Task Number	Item	Date(s)	Recorded By
<hr/> This is a knowledge-based module; there is no performance testing. <hr/>			

MODULE 32415 – COMMERCIAL HEATING AND COOLING SYSTEMS

Task Number	Item	Date(s)	Recorded By
32415-1	Demonstrate an awareness of the safety precautions used when working on hot water/ chilled water systems.		
32415-2	Recognize the major components of a hot water heating system and explain the purpose of each component.		
32415-3	Recognize and explain the purpose of each operating control and accessory used with hot water boilers.		
32415-4	Demonstrate and/or describe how to turn on, operate, and turn off a gas-fired and/or oil-fired hot water boiler and related hot water system components.		
32415-5	Develop a preventive maintenance checklist for hot water systems.		
32415-6	Recognize the major components of a chilled water cooling system and explain the purpose of each component.		
32415-7	Identify the components of both a mechanical compression-type and absorption-type chiller. Compare the operation of the two types.		
32415-8	Demonstrate or describe how to turn on, operate, and turn off a chiller and related chilled water system components.		
32415-9	Develop a preventive maintenance checklist for a chilled water system.		
32415-10	Identify the types of piping distribution systems used with hot water, chilled water, and dual-temperature water systems.		

Level Five

MODULE 32501 – PREVENTIVE AND PREDICTIVE MAINTENANCE

Task Number	Item	Date(s)	Recorded By
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This is a knowledge-based module; there is no performance testing.

MODULE 32502 – PERFORMING REVERSE ALIGNMENT

Task Number	Item	Date(s)	Recorded By
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32502-1	Measure shaft runout, using a dial indicator jig.		
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32502-2	Set up a complex reverse alignment jig.		
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32502-3	Measure indicator sag, using a complex reverse dial indicator jig.		
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32502-4	Perform reverse alignment, using the alignment demonstration rig and the graphical chart.		
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32502-5	Perform reverse alignment, using the alignment demonstration rig and the mathematical equation.		
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MODULE 32503 – PERFORMING LASER ALIGNMENT

Task Number	Item	Date(s)	Recorded By
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32503-1	Identify the major components of the Optalign laser alignment system.		
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32503-2	Perform a rough alignment.		
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32503-3	Set up the laser alignment equipment.		
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32503-4	Check the initial alignment.		
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32503-5	Draw a scale graphical plot of a machinery train.		
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32503-6	Align the machinery train.		
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32503-7	Measure shaft sag.		
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32503-8	Vertically align a machine.		
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MODULE 32504 - TROUBLESHOOTING AND REPAIRING PNEUMATIC EQUIPMENT

Task Number	Item	Date(s)	Recorded By
32504-1	Inspect pneumatic system components.		
32504-2	Prepare system for shutdown and repair.		
32504-3	Disassemble components.		
32504-4	Reassemble components.		
32504-5	Install components in system.		

MODULE 32505 – TROUBLESHOOTING AND REPAIRING PUMPS

Task Number	Item	Date(s)	Recorded By
32505-1	Inspect pumps.		
32505-2	Troubleshoot pumps.		
32505-3	Prepare pumps for shutdown and repair.		
32505-4	Remove pumps from system.		
32505-5	Disassemble pumps.		
32505-6	Reassemble pumps.		
32505-7	Install mechanical seals.		
32505-8	Install pump in system.		
32505-9	Perform pump start-up checks.		

MODULE 32506 – TROUBLESHOOTING AND REPAIRING HYDRAULIC EQUIPMENT

Task Number	Item	Date(s)	Recorded By
32506-1	Inspect hydraulic system components.		
32506-2	Troubleshoot and repair the following: <ul style="list-style-type: none">• Hydraulic fluid reservoirs• Filters and strainers• Hydraulic pumps• Hydraulic motors• Control valves• Cylinders• Hoses, fluid lines, and gauges		

MODULE 32507 – TROUBLESHOOTING AND REPAIRING GEARBOXES

Task Number	Item	Date(s)	Recorded By
32507-1	Identify types of gears.		
32507-2	Identify types of gearboxes.		
32507-3	Troubleshoot gearboxes.		
32507-4	Remove and disassemble gearboxes.		
32507-5	Identify gear wear patterns.		
32507-6	Measure and adjust backlash and bearing clearance.		
32507-7	Install gearboxes.		

MODULE 32508 – PROGRAMMABLE LOGIC CONTROLLERS

Task Number	Item	Date(s)	Recorded By
32508-1	Using a PLC system (or a diagram of a PLC), identify the basic hardware components of the PLC.		
32508-2	Given a ladder logic diagram, point out the purpose of the commonly-used symbols on the diagram.		
32508-3	Given a PLC system diagram, explain the basic steps involved in identifying a problem with the PLC.		

MODULE 32509 – INSTRUMENT DRAWINGS AND DOCUMENTS

Task Number	Item	Date(s)	Recorded By
32509-1	Explain what is represented by the heavier, dark lines on the drawing.		
32509-2	Identify the loop number in which "Analysis" is the measured or initiating variable.		
32509-3	Identify the type of instrument indicated by the instrument symbol for tag number FT-100.		
32509-4	Locate the instrument with tag number AIC-130.		
32509-5	The signal line between instruments with tag numbers FY-101A and FIC-100 is _____.		
32509-6	Identify the discrete instrument in the drawing.		
32509-7	Explain what the letter "D" designates for the instrument with tag number TDT-150.		
32509-8	Identify the type of signal line going to the valve below the instrument with tag number FIC-100.		
32509-9	Explain why letters have been added to the loop numbers for instruments with tag numbers FY-100A and FY-100B.		
32509-10	Locate the instrument with tag number AE-130.		
32509-11	Find the tag number of the instrument with an output "control" function in loop 100.		
32509-12	Explain what the letter "T" designates for the instrument with tag number AT-130.		

MODULE 32510 – FLOW, PRESSURE, LEVEL, AND TEMPERATURE

Task Number	Item	Date(s)	Recorded By
32510-1	Identify ten measurement devices from physical appearance.		
32510-2	Explain the variable measured by each device.		
32510-3	Explain the principles of operation of each device.		

MODULE 35211 – PROCESS CONTROL THEORY

Task Number	Item	Date(s)	Recorded By
32511-1	Draw and accurately label a block diagram for a typical basic process control loop.		
32511-2	Identify the major components and signals in a given set of P&IDs.		
32511-3	Identify satisfactorily the accuracies, ranges, spans, and /or linearities of given instrumentation from typical documentation.		
32511-4	Calculate open-loop data for a given system.		

MODULE 32512 – PRECISION MEASURING TOOLS

Task Number	Item	Date(s)	Recorded By
32512-1	Use levels.		
32512-2	Use feeler gauges.		
32512-3	Use calipers.		
32512-4	Use micrometers.		
32512-5	Use dial indicators.		
32512-6	Use protractors.		
32512-7	Use parallels and gauge blocks.		
32512-8	Use trammels.		
32512-9	Use precision straightedges.		
32512-10	Use speed measurement tools.		
32512-11	Use pyrometers.		

MODULE 32513 - FORKLIFTS

Task Number	Item	Date(s)	Recorded By
32513-1	Pick up and place a load at ground level.		
32513-2	Pick up and place a load at an elevated level.		
32513-3	Travel with a load on the forks.		
32513-4	Travel with a load suspended from the forks.		
32513-5	Use a forklift in conjunction with rigging equipment to pick up and place a load.		

MODULE 32514 – FIBER OPTICS

Task Number	Item	Date(s)	Recorded By
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This is a knowledge-based module; there is no performance testing.