



## Performance Based Objectives – Industrial Electronics\*

PBO No.	Performance Based Objective
EL-1	Match a list of conductors, semiconductors, and insulators to their properties.
EL-2	Match a list of Solid State terms to their proper definitions. <ul style="list-style-type: none"><li>- Electron flow</li><li>- Hole flow</li><li>- P-type material</li><li>- N-type material</li><li>- Barrier voltage</li><li>- Depletion region</li><li>- Biasing (forward/reverse)</li><li>- Electron</li><li>- Proton</li><li>- Neutron</li><li>- Valance Shell</li><li>- Negative Ion</li><li>- Trivalent Material</li><li>- Pentavalent Material</li><li>- Semiconductor Crystal</li><li>- Impurities</li><li>- Doping</li><li>- Passive Component</li><li>- Covalent Bonding</li></ul>
EL-3	List the two most common diode ratings that should not be exceeded.
EL-4	Match the following list of electronic components to their proper description of operation and/or construction and to their correct schematic symbol: <ul style="list-style-type: none"><li>- Diode</li><li>- Zener Diode</li><li>- Light Emitting Diode (LED)</li><li>- Bipolar Junction Transistor</li><li>- Thyristor</li><li>- UJT</li><li>- SCR</li><li>- Diac</li><li>- Triac</li><li>- FET</li><li>- IGBT</li><li>- Op Amp</li></ul>
EL-5	Test several semiconductor diodes with an ohmmeter and identify if their condition is shorted, open, or good.
EL-6	Given the applied voltage, indicate the voltage drops across each component of a series circuit that has a diode and resistor, when forward and reverse biased.





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EL-7	Construct a series circuit that has a Zener diode and resistor, predict and verify in lab the Zener diode current and voltage when the load resistor value and the voltage changes.
EL-8	Match a list of components of each section of a DC Power supply to its proper operation.
EL-9	Given the input voltage of a power supply, determine the secondary of the transformer based on the turn ratio, the amplitude of the pulsating dc output voltage of the rectifier, and the dc output of the filter circuit.
EL-10	For each section of a DC power supply, draw the waveforms of the input and output.
EL-11	Using a sine wave timing diagram, indicate on the diagram when the diode is forward-biased and reverse-biased, and when the filter capacitor charges and discharges.
EL-12	Match a list of voltage regulation and filtering components to their proper description of how they perform their circuit function.
EL-13	Given the frequency of the applied AC supply voltage, list the frequency of the pulsating DC voltage at the outputs of a half-wave and full-wave rectifier.
EL-14	Given the peak voltage of a pulsating DC voltage of half wave and full wave rectifiers, determine the average voltage.
EL-15	Given the peak-to-peak value of an AC voltage applied to the rectifier, determine the required minimum PIV rating of the rectifier diode in the circuit.
EL-16	Given various symptoms of a defective filtered rectifier circuit, determine the cause of the fault.
EL-17	Match a list of the effects of a failed component filter capacitor, load resistor, and voltage frequency on the ripple amplitude of a dc power supply.
EL-18	Given a schematic, construct an AC electrical circuit that uses a diode and resistor, and then use an oscilloscope to show how the diode will rectify on only one alternation of a sine wave.
EL-19	Given a schematic, construct an AC electrical circuit that uses two diodes and a resistor, and then use an oscilloscope to show how the two diodes can pass current on both alternations of a sine wave.
EL-20	Given a schematic, construct an AC electrical circuit that uses four diodes and a resistor, and then use an oscilloscope to show how the four diodes in the bridge circuit can produce full-wave rectification without using a center-tapped transformer.
EL-21	List the three terminals of the bipolar transistor, and how to use resistors to properly bias the junctions, and operate the transistor as an amplifier.
EL-22	Test several transistors with an ohmmeter and identify if their condition is shorted, open, or good.
EL-23	Given a schematic, construct a DC electrical circuit that uses a transistor, resistors, and lamp, demonstrate how the bipolar transistor can operate as a switching device.
EL-24	Given a schematic, construct a DC electrical circuit that uses a transistor and resistors, and then using an oscilloscope, demonstrate how the bipolar transistor operates as an amplifier.
EL-25	Construct an electrical circuit that uses a UJT to generate timed pulses. Verify proper circuit action with an oscilloscope.





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EL-26	Construct a circuit containing an SCR and an UJT to control power in a load resistor. A variable RC time constant will adjust the power. Sketch the Output voltage at full and 50% power. Verify the sketch with the scope.
EL-27	Using an oscilloscope, determine the electrical characteristics of a Diac.
EL-28	Construct a circuit that uses a Diac and Triac to control the AC power in a load. A variable RC time constant will vary the power applied to the load.
EL-29	Given a schematic of an inverting amplifier using an OP Amp, predict the voltage gain of the circuit. Construct and verify.
EL-30	Given a schematic of a non-inverting amplifier using an OP Amp, predict the voltage gain of the circuit. Construct and verify.
EL-32	Given a schematic of an Op Amp comparator and the input voltages predict the output voltage. Construct and verify.
EL-33	Given the logic states applied to the inputs of a digital AND gate, list the logic states that will be produced at its output.
EL-34	Generate a truth table for a 2 input “And Gate”, “Or Gate “and “Nand Gate”. Construct and verify.
EL-35	List advantages of fiber optic cable.
EL-36	List the different types of fiber optic terminating connectors.
EL-37	List safety hazards associated with laser equipment and precautionary measures that should be taken.
EL-38	Construct a circuit to couple an AC source voltage (switched on and off) to a DC signal (switching on and off) using an optical isolator IC.

**\*Note: This course does not contain digital electronics nor microprocessors.**

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