

**Tri-County Technical College**  
Industrial Mechanics/HVAC Department - Industrial and Engineering Technology Division  
Technical Advanced Placement (TAP) Program

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**Competency Verification and Teacher Recommendation Form**

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**IMT 140 (Industrial Electricity)**

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**SECTION I (To be completed by the student)**

Please complete this section of the form and give it to your Industrial Mechanics, Environmental Controls Technology, or Air Conditioning/Heating/Refrigeration teacher.

Your Name (*PLEASE PRINT*): \_\_\_\_\_ SSN: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

High School: \_\_\_\_\_ Grade: \_\_\_\_\_

**SECTION II (To be completed by the teacher)**

By placing my initials next to the appropriate competency statement listed on the back of this form, I verify that this student has mastered major competencies of IMT 140 (*Industrial Electricity*), as defined in the approved syllabus dated January, 1999. I understand that in order to progress in the validation process for Technical Advanced Placement credit, *a minimum of 75 percent of the competencies must be verified*. Having met this requirement, I recommend this student be permitted to continue the validation process by completing the TAP exam, which I understand will be arranged through the Industrial Mechanics Department at Tri-County Technical College.

Teacher Name (*PLEASE PRINT*): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Name of high school course(s) in which this student gained the required competencies for possible TAP advanced standing:

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Date of course completion or expected completion: \_\_\_\_\_

Comments (if applicable): \_\_\_\_\_

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Please make a copy of this form for your records and mail the original to Ms. Tonia McClain, Industrial and Engineering Technology Division Secretary, Tri-County Technical College, PO Box 587, Pendleton, SC 29670. (Questions regarding TAP procedures for IMT 140 should be directed to Mr. Franklin Smith, IM/HVAC Department Head, at 646-8361, extension 1413.)

## **COMPETENCIES (please initial each one)**

- \_\_\_\_\_ 1. Discuss the composition of the universe; identify seven elements commonly used in electrical components; discuss electrons, protons, and neutrons in the atom composition; define positive and negative electrical charge; determine mass and diameter of electrons; discuss static electricity.
- \_\_\_\_\_ 2. List uses of magnetism; identify classes of magnetic materials; give examples of magnetic, nonmagnetic and diamagnetic materials; identify rules of magnetic fields; describe magnetism and ways to alter magnetic fields; relate electricity to magnetism.
- \_\_\_\_\_ 3. Discuss electricity; identify causes of an electric current; trace simple electric current; identify and draw electrical symbols; determine gauge and diameter of wire sizes; characterize silver, gold, copper and aluminum conductors.
- \_\_\_\_\_ 4. Discuss resistor, voltage drop, source voltage, voltage rating, and improper voltage; construct and use a trouble light; prove voltage across a light.
- \_\_\_\_\_ 5. List and identify the effects of current flow in a circuit; list factors that determine current flow; define milliamperes and microamperes; discuss the function of a fuse.
- \_\_\_\_\_ 6. Discuss resistance and Ohms; measure resistance; install variable resistors and potentiometers; apply Ohm's Law to voltage, resistance and current; identify the effect of temperature on resistance; construct a circuit using a buss bar.
- \_\_\_\_\_ 7. Discuss how voltage is generated by friction, heat, light, pressure, chemical action, and/or mechanical motion; generate voltage by each of the previously listed methods.
- \_\_\_\_\_ 8. Give the technical definition of work, energy, and power; solve problems involving work and/or power.
- \_\_\_\_\_ 9. Discuss the characteristics of electron current flow, volt meters, ammeter meters and ohm meters; measure DC voltage, DC current and resistance.
- \_\_\_\_\_ 10. Describe a series and/or parallel circuit to include voltage sources, resistors, and voltage drop; measure resistance and voltage drops in a series and/or parallel circuit; describe current and power and parallel circuits; describe a series-parallel circuit; compute resistance in a series-parallel circuit; identify applications of series-parallel circuits.
- \_\_\_\_\_ 11. Describe how voltage is induced in a conductor; demonstrate the left hand generator rule; describe self-excited generator; describe how an automobile generator works; discuss DC voltage production by a conductor rotating in a magnetic field.
- \_\_\_\_\_ 12. Discuss frequency, amplitude, average voltage, RMS voltage, RMS current; convert RMS values into average values; define phase; discuss AC motor and AC generator; compare AC and DC voltages.
- \_\_\_\_\_ 13. Define and measure inductance and capacitance; identify the use of resistors, inductors and capacitors in circuits; illustrate the effects of inductance and capacitance in AC circuits.
- \_\_\_\_\_ 14. Define transformer; discuss the usage of transformers and power losses and turns ratios in transformers.
- \_\_\_\_\_ 15. Discuss how voltage, current and power are related in a purely resistive, inductive and/or capacitive circuit; determine inductive and capacitive reactance; calculate impedance.
- \_\_\_\_\_ 16. Read a line diagram; describe solenoid, contractor and magnetic starter; identify common electrical symbols; give rules regarding and basic sections of line diagrams; identify the following logic functions: AND, OR, AND/OR Combinations, NOT, MEMORY, NOR and NAND.
- \_\_\_\_\_ 17. Identify reasons for discontinued use of the knife switch; explain the difference between line diagram and wiring diagram and between manual contactor and manual starter; explain the purpose of overload protection for motors; give the proper number of fuses for 12-volt, 230-volt single phase and 230-volt three phase circuits.
- \_\_\_\_\_ 18. Identify the type of contactors used in electrical applications; distinguish between two-wire and three-wire control circuits; give the major differences between AC and DC contactor; identify the types of overload protection; list factors associated with the selection of overload protectors.