ELECTRICIAN/1: FUNDAMENTALS (120 Hours)

Course No.: 72-75-50

COMPETENCY CHECKLIST

Student Name _____

Teacher Name _____ School Site _____

Start Date _____ Completion Date _____ Certificate Date_____

Teacher Signature _____ Student Signature _____

(Signatures verify completion of course competencies)

A. <u>ORIENTATION AND SAFETY</u> (3 hrs)

_____ 1. Class expectations
_____ 2. Class rules
_____ 3. Ability to read and follow instructions
_____ 4. Standard shop procedures
_____ 5. Shop safety rules and regulations
_____ 6. First aid practices for industry
_____ 7. Demonstrate CPR
_____ 8. Cal/OSHA regulations for industry
_____ 9. EPA regulations
____ 10. NEC's role in safeguarding work conditions
____ 11. Safety test

B. <u>MATHEMATICS</u> (20 hrs)

_____ 1. Metric system and its trade applications
_____ 2. Decimal system and its trade applications
_____ 3. Fractional system and its trade applications
_____ 4. Solve various basic math problems
_____ 5. Transpose three-element formulas
_____ 6. Solve problems using three-element formulas
_____ 7. Math calculations to solve for the unknown
_____ 8. Solve trade problems using powers of 10

C. <u>FUNDAMENTAL ELECTRICAL CONCEPTS</u> (14 hrs)

_____ 1. Definitions of electrical concepts
_____ 2. Five sources of electricity
_____ 3. Fundamentals of electric theory
_____ 4. Fundamentals of direct current theory
_____ 5. Flow of power in DC circuits
_____ 6. Operation of a simple battery or cell
_____ 7. Polarity as it applies to batteries
_____ 8. Conductors, insulators, semiconductors
_____ 9. Electron structure of conductors & insulators
____ 10. Examples of magnetic/nonmagnetic metals
____ 11. Relationship between magnetism & electricity
____ 12. Draw basic generator with polarities & outputs

D. <u>STORAGE BATTERIES IN DC CIRCUITS</u> (2 hrs)

_____ 1. Parts of a battery
_____ 2. Various types of batteries
_____ 3. Function of batteries
_____ 4. Checking & maintaining storage batteries
_____ 5. Operation of simple DC circuits
_____ 6. Schematic diagram of a simple DC circuit

E. <u>OHM'S LAW</u> (40 hrs)

_____ 1. Definitions for electrical terms
_____ 2. Other names for voltage
_____ 3. Other names for current flow
_____ 4. Other forms of resistance
_____ 5. Electrical-related laws and theorems
_____ 6. Simple circuit illustrating Ohm's law
_____ 7. Solve various Ohm's law problems
_____ 8. 5 elements present in electrical circuits
_____ 9. Three effects of electrical power
____ 10. Relationship of electrical to mechanical power
____ 11. Define types of circuits
____ 12. Draw a simple series circuit
____ 13. Rules governing current & voltage in series
____ 14. Perform calculations related to series circuits
____ 15. Draw a simple parallel circuit
____ 16. Rules governing voltage & current in parallel
____ 17. Draw voltage & current paths in circuits
____ 18. Solve problems for unknown quantities
____ 19. Rules for equal resistances in circuits
____ 20. Formula for 2 unequal resistances in parallel
____ 21. Combined values for given unequal resistances
____ 22. Formula for unequal resistances in parallel
____ 23. Problems: unequal values of resistances in parallel

____ 24. Series, parallel, and series-parallel circuits
____ 25. Reduce to simplest form series-parallel circuits
____ 26. Solve problems using series-parallel circuits
____ 27. Effects of series resistances in circuits
____ 28. NEC requirements for voltage drop in circuits
____ 29. Commonly used wire sizes in electrical trade
____ 30. Numerical size vs. physical size of wire
____ 31. Effects of wire, length, resistance, current
____ 32. Types of insulation encountered in the trade

F. <u>ALTERNATING CURRENT THEORY</u> (40 hrs)

_____ 1. Define terms related to AC theory
_____ 2. Rules for generation of sine wave
_____ 3. Calculate value: RMS, peak voltage, currents
_____ 4. Calculate amount of time in a sine wave
_____ 5. Theory behind AC generation
_____ 6. Generation of single- & 3 phase power
_____ 7. DC, single-phase, 3-phase power systems
_____ 8. Units of measure for inductance
_____ 9. Flux linkages by means of drawings
____ 10. Elec. equipment having or using inductance
____ 11. Inductive reactance using counter EMF
____ 12. Characteristics of voltages in circuits
____ 13. Characteristics: magnetism/electromagnetism
____ 14. Theory of Superposition
____ 15. Using the Theory Superposition in problems
____ 16. Operation/characteristics of 3 wire systems
____ 17. Phases using current & voltage sine waves
____ 18. Compare & contrast voltages/currents
____ 19. Components that utilize mutual inductance
____ 20. Reactance vs. power factor impedance
____ 21. Transformer action
____ 22. Transformer turns ratio vs. voltage/current
____ 23. General rules of transformer operation
____ 24. Compare types of transformers
____ 25. Conditions important to the transformer
____ 26. Compare transformer input & output power
____ 27. Calculate efficiency of transformers
____ 28. Nameplate information on transformers
____ 29. Selection and installation of transformers
____ 30. Different distribution systems
____ 31. Input & output currents of transformers
____ 32. Safe use of the current transformer
____ 33. Measure transformer parameters
____ 34. Make proper polarity connections
____ 35. List parts of capacitors
____ 36. Construction of capacitors
____ 37. Cautions when using capacitors
____ 38. Calculate capacitive reactance
____ 39. List various uses of capacitive devices
____ 40. Compare real and reactive power
____ 41. Power factor
____ 42. Various reasons to minimize power factor
____ 43. Two main methods of reducing power factor

G. <u>RESOURCE MANAGEMENT</u> (1 hr)

_____ 1. Resource management principles/techniques
_____ 2. Management of time, materials, personnel
_____ 3. Effective use of time, material, personnel
_____ 4. Benefits of effective resource management