Center for Curriculum and Transfer Articulation

Power Plant Components

Course: **PPT121**	Lec + Lab **3** Credit(s) **4** Period(s) **3.7** Load
	Course Type: **Occupational**
First Term: **2013 Summer I**	Load Formula: **S- Standard**
Final Term: **Current**	

Description: Theory, construction and application of basic power plant mechanical components. Basic concepts of electrical fundamentals and electronics discussed.

Requisites: Prerequisites: None.

MCCCD Official Course Competencies

1. Apply the theory, construction and application of basic mechanical components. (I)
2. Apply the theory, construction and application of diesel engines. (II)
3. Apply the theory, construction and application of air conditioning, heating, and ventilation systems, including refrigeration machines and the basic refrigeration cycle. (III)
4. Apply the theory, construction and application of structural and auxiliary equipment. (IV)
5. Apply the theory, construction and application of rotating equipment. (V)
6. Apply the theory, construction and application of resistive electrical equipment. (VI)
7. Apply the theory, construction and application of electrical supply components. (VII)
8. Apply the theory, construction and application of electrical control components. (VIII)
9. Apply the theory, construction and application of valve actuator types (such as motors, pneumatic, hydraulic). (IX)
10. Apply the theory, construction and application of electronic equipment. (X)
11. Apply the basic concepts of electrical fundamentals and electronics. (XI)

MCCCD Official Course Outline

I. Theory, Construction and Application of Basic Mechanical Components
A. Air Compressors
B. Heat Exchangers
C. Pumps, Ejectors, and Eductors
D. Strainers, Filters, and Steam traps
E. Steam Turbines
F. Valves and Dampers
II. Theory, Construction and Application of Diesel Engines
A. accessories/support systems
B. failure mechanisms and systems
C. main structural components
D. main moving components
E. principles of operations

III. Theory, Construction and Application
A. Air Conditioning
B. Heating
C. Ventilation
D. Refrigeration Cycle
IV. Theory, Construction and Application of Structural and Auxiliary Equipment
A. boilers (such as electric, gas-fired, fuel-oil-fired)
B. elevators (such as basic operation of and basic rescue methodology)
C. fire barriers (such as purpose and construction of and identification of barrier degradation)
D. hangers and snubbers for support and restraint (such as discussion on water hammer and the different types, including water slug, valve slam, column rejoining, and condensate-induced)
E. hoists and cranes (such as manual and electric)
V. Theory, Construction and Application of Rotating Equipment
A. generators
B. motors
C. motor-generators
VI. Theory, Construction and Application of Resistive Electrical Equipment
A. heaters
B. heat tracing (such as reasons for using heat tracing)
VII. Theory, Construction and Application - Electrical Supply Components
A. batteries and chargers
B. circuit breakers (such as protection)
C. inverters and uninterruptible power supplies
D. switchgear, load centers, and motor control centers (such as protective relaying and schematics of a basic system from high voltage to lower voltage)
E. transformers (such as stepup and stepdown transformers and winding configurations)
VIII. Theory, Construction and Application - Electrical Control Components
A. cable (such as routing for train separation and methods of fire detection/protection for cables/cable trays)
B. control circuits (such as proportional, integral, and derivative, or a combination thereof)
C. meters (such as voltage and current; and how a change in meter indication could indicate circuit degradation of a change in process (pump discharge valve opened for increased flow))
D. relays (such as schematics to show operation of relays that energize to actuate, deenergize to actuate, time delay energize, and time delay deenergize)
IX. Theory, Construction and Application - Valve Actuators
A. manual operation (such as methods used for different types of actuators)
B. position indication (such as methods used for indication, local and remote indications, and observation of process indications to determine valve position)
C. impact of environmental conditions
X. Theory, Construction and Application - Electronic Equipment
A. analyzers (such as H2, O2, and chemical)
B. computers/microprocessors (plant specific)
C. signal converters
XI. Electrical Fundamentals and Electronics
A. Direct Current (DC)

A. Direct Current (DC)

1. basic electrical circuits, such as series and parallel, series-parallel combinations
2. conductors and insulators
3. DC theory and DC sources (such as ideal voltage and current, non-ideal voltage, and current
4. electrical laws (such as Ohm?s law, Kirchhoff?s voltage, and current laws)
5. electron theory
6. units of electrical measurement (such as ohms, volts, amps, watts, coulombs,
7. joules)
8. voltage, current, and resistance (content added: power)

B. Alternating Current (AC)

1. AC theory and AC sources (such as ideal voltage and current, non-ideal voltage, and current)
2. basic electrical circuits, such as series and parallel
3. units of electrical measurement (such as henries, farads, reactance, impedance)
4. (content added: passive components, capacitors, inductors)
5. (content added: single-phase versus three-phase)
6. voltage, current, impedance, and real, reactive, apparent power, and power factor relationships

Last MCCCD Governing Board Approval Date: **March 26, 2013**