I. INTRODUCTION TO BOILERS

1. BASIC PRINCIPLES OF BOILER OPERATION
2. TERMINOLOGY – UNDERSTANDING SPECIAL TERMS AND WORDS
3. INTRODUCTION TO BOILER TYPES
   A) HYDRONIC (HOT WATER) BOILERS
   B) STEAM BOILERS (LOW & HIGH PRESSURE)
   C) FIRE TUBE BOILERS
   D) WATER TUBE BOILERS
   E) CAST IRON SECTIONAL BOILERS
   F) FIN TUBE BOILERS
   G) MODULAR BOILERS

II. BOILER SYSTEMS

1. BASIC HYDRONIC (HOT WATER) SYSTEM
   A) PIPING, PUMPS & VALVES
2. BASIC STEAM SYSTEMS
   A) PIPING, PUMPS & VALVES
3. BOILER FITTINGS
   A) SAFETY & RELIEF VALVES
   B) STEAM & TEMPERATURE GAUGES
   C) WATER COLUMNS
   D) BOTTOM BLOWN DOWN VALVES & SURFACE BLOW DOWN
   E) BOILER VENT VALVES AND CONTROLS
   F) PRESSURE CONTROLS FOR STEAM BOILERS
   G) TEMPERATURE CONTROLS FOR STEAM BOILERS
4. BURNER OPERATIONS AND MAINTENANCE
   A) GAS BURNERS
   B) OIL BURNERS

III. FEEDWATER COMPONENTS & EQUIPMENT

1. FEEDWATER SYSTEMS
2. CITY MAKE-UP WATER SYSTEMS
3. FEEDWATER CONTROLS & REGULATORS
4. LOW WATER CUT OFF’S
   A) TESTING
   B) MAINTENANCE

IV. STEAM ACCESSORIES

1. STEAM VALVES & CONTROLS
2. STEAM TRAPS & STRAINERS

V. SAFETY & CONTROL DEVICES FOR AUTOMATIC FIRED BOILER
   (ASME-CSD-1 code year 2002)

1. STEAM AND WATERSIDE CONTROLS
2. FUEL & COMBUSTION CONTROLS
3. PREVENTATIVE MAINTENANCE REQUIREMENTS
   A) DAILY SCHEDULE
   B) WEEKLY SCHEDULE
   C) MONTHLY SCHEDULE
   D) SEMI-ANNUAL SCHEDULE
   E) ANNUAL SCHEDULE
   F) SUMMER MAINTENANCE

VI. IRI (IMPROVED RISK INSURES) REQUIREMENTS

1. CONTROL STANDARDS
2. Gas Trains
3. Oil Trains

VII. ASME Pressure Vessel Codes (2004 Edition)
1. ASME Section I. – Power Boilers
2. ASME Section II. – Materials
3. ASME Section IV. – Heating Boilers
4. ASME Section V. – Non-Destruct Examinations
5. ASME Section IX. – Welding & Welder's Qualifications
6. Jurisdictional Requirements for Repairs to ASME Boilers and Pressure Vessels

VIII. National Boiler Inspectors Code
1. General Guidelines for Inspection
2. “R” Stamp Requirements
3. Hydrostatic Test

IX. Combustion & Burner Calibration
1. Elements of Combustion
   a) O2 Oxygen
   b) CO Carbon Monoxide
   c) CO2 Carbon Dioxide
   d) H2SO4 Sulfuric Acid
2. Burner Calibration
   a) Natural Gas Burners
   b) L.P. Gas Burners
   c) Oil Burners
   d) Combination Gas/Oil Burners

X. Boiler Water Treatment
1. Scale
2. Oxygen in Boiler Water
3. Feeding Boiler Chemicals
4. Priming & Carryover
5. Boiler Water Treatment
6. Boiler Water Contamination

XI. Auxiliary Equipment
1. Building Automation System
   a) Pumps-Operation and Maintenance
   b) Safety Valve Sizing & Installation
   c) Temperature & Pressure Controls Maintenance & Operations
   d) Alarms

XII. Boiler Operation
1. Start-Up Procedures
2. Shut-Down Procedures
3. Proper Blow-Down Procedures
4. Low-Water Conditions
5. Laying-Up Boilers
6. Gauge Glass
A) BROKEN GLASS
B) LEAKS
C) CLEANING GAUGE GLASS

7. FURNACE EXPLOSIONS
8. PREPARING FOR INSPECTION
9. MAINTAINING BOILER LOG

XIII. BOILER ROOM SAFETY

1. BOILER ROOM ACCIDENTS
2. BOILER ROOM FIRE PREVENTION
3. SAFETY RULES

XIV. EXAM (4 HOURS)