EE020: Economic Dispatch of Power Plants
Training Description:

Electric utility investment practices and operation have been designed to ensure affordable, reliable electricity service to consumers. Affordability and reliability require thoughtful, long-term investments in generation and transmission as well as sophisticated operation of these assets. Economic dispatch focuses on short-term operational decisions, specifically how to best use available resources to meet customers’ electricity needs reliably and at lowest cost.

Ensuring the best use of available resources is much more than a mechanical process of minimizing the total variable cost of electricity production. In seeking lowest-cost production, economic dispatch practices must take into account several factors, including: the continuous variation in loads and generators’ inability to respond instantaneously; the need to maintain reserves and plan for contingencies in order to maintain reliability; and the scheduling requirements imposed by environmental laws, hydrological conditions, and fuel limitations.

Training Objectives:

By the end of the training, participants will be able to:
- Apply and gain an in-depth knowledge on economic dispatch
- Identify the characteristics of power generation units and introduce them to the economic dispatch of thermal units and the methods of solution
- Discuss the transmission system effects, Unit commitment and the generation with limited energy supply
- Implement the production cost models and be able to adapt the control of generation
- Explain the interchange of power and energy and their types and discuss the factors affecting the power system security
- Estimate power systems and calculate the optimal power flow
- Use new techniques of solving old problems and new problem areas that are arising from changes in the system development patterns, regulatory structures and economics

Training Designed for:

This course is suitable for Operation Engineers, Planning Engineers, Dispatch Operator, Studies Engineer and Dispatch Supervisor.

Training Program:

**DAY ONE:**

- PRE-TEST
- Module 01: Power System Components
  - Generation Overview (incl: solar & wind)
  - Transmission Systems
  - Distribution & Consumption
  - Protection & Telecommunications
  - Electrical Fundamentals
    - Voltage, Current, Power & Power Factor
    - Voltage Drop and Limits
Electrical Load phase relationships (lead-lag)
- Losses and Efficiency
- Power System Characteristics and
- Control of Voltage
- Power System Characteristics &
- Control of Frequency
- Emergency Control Measures
- Frequency Response of Prime Movers

Module 02: Dispatch & Energy Control
- Supervisory Control & Data
- Acquisition (SCADA)
- System Analysis Monitoring and Control
- Sectionalizing and Isolation
- Emergency Situations
- Outage Management
- Distribution Automation

DAY TWO:

Module 03: Substation Integration and Automation Technical Issues
- Control Centers Hierarchy
- System Responsibilities
- Substation Automation Applicability
- Benefits of Open System Approach
- System Architecture
- Data Acquisition and Control Level
- Information Infrastructure Level
- Substation Host Processor

DAY THREE:

Module 04: Management Systems
- Electrical system automation Supervisory control and data acquisition (SCADA)
- EMS functional scope
- DMS functional scope
- Application in power system

Module 05: SCADA System Components
- Hardware
- Software
- Adaptation Work
- Modern Control Center Architectures
  - Redundancy
  - Distributed Function
  - Open System Design
- SCADA System Integration
- Horizontal Integration
**DAY FOUR:**

❖ **Module 06: Communication**
- Communication Standards and Protocols
- Communication Hardware
- Data Communication System
- Voice Communication
- Communication Channel Configuration-
  - 6.6 Communication Media

**DAY FIVE:**

❖ **Module 07: Economic Dispatch**
- What is Economic Dispatch?
- “Economic” Dispatch vs. “Efficient” Dispatch
- Security-Constrained Unit Commitment
- Grid Conditions that Constrain Economic Dispatch
- Resource Considerations that Constrain Economic
- Dispatch Security-Constrained Economic Dispatch
- Current Practices in Building the Economic Dispatch
- Resource Stack
- What’s Left for Economic Merit Order Dispatch?
- Current Practices for Optimizing Dispatch
- Variations in Economic Dispatch Practices
- How Large Should a Dispatch Area Be?
- Economic Dispatch and Reliability

❖ **Course Conclusion**
❖ **POST-TEST and EVALUATION**

**Training Requirements:**

“Hands-on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the above topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

**Training Methodology:**

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-
- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test
Training Certificate(s):
Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:
As per the course location - This rate includes participant’s manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:
07:45 - 08:00  Morning Coffee / Tea
08:00 - 10:00  First Session
10:00 - 10:20  Recess (Coffee/Tea/Snacks)
10:20 - 12:20  Second Session
12:20 - 13:30  Recess (Prayer Break & Lunch)
13:30 - 15:00  Last Session

For training registrations or in-house enquiries, please contact:
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Training & Career Development Department