GCC Electrical
Testing Laboratory
المفتبر الفليجي لفحص المعدات الكهربائية

Power System Studies and Performance Checks

Any transmission or distribution network must be modeled to analyze the power flows and to evaluate how to reinforce it in case of load increase and the real level of short circuit current any circuit breaker installed must withstand.

Addressed to:

Engineers involved in the power system performance analysis

Duration:

5 Full Days

Location/Venue:

GCCIA HQ, Dammam

Course Fees:

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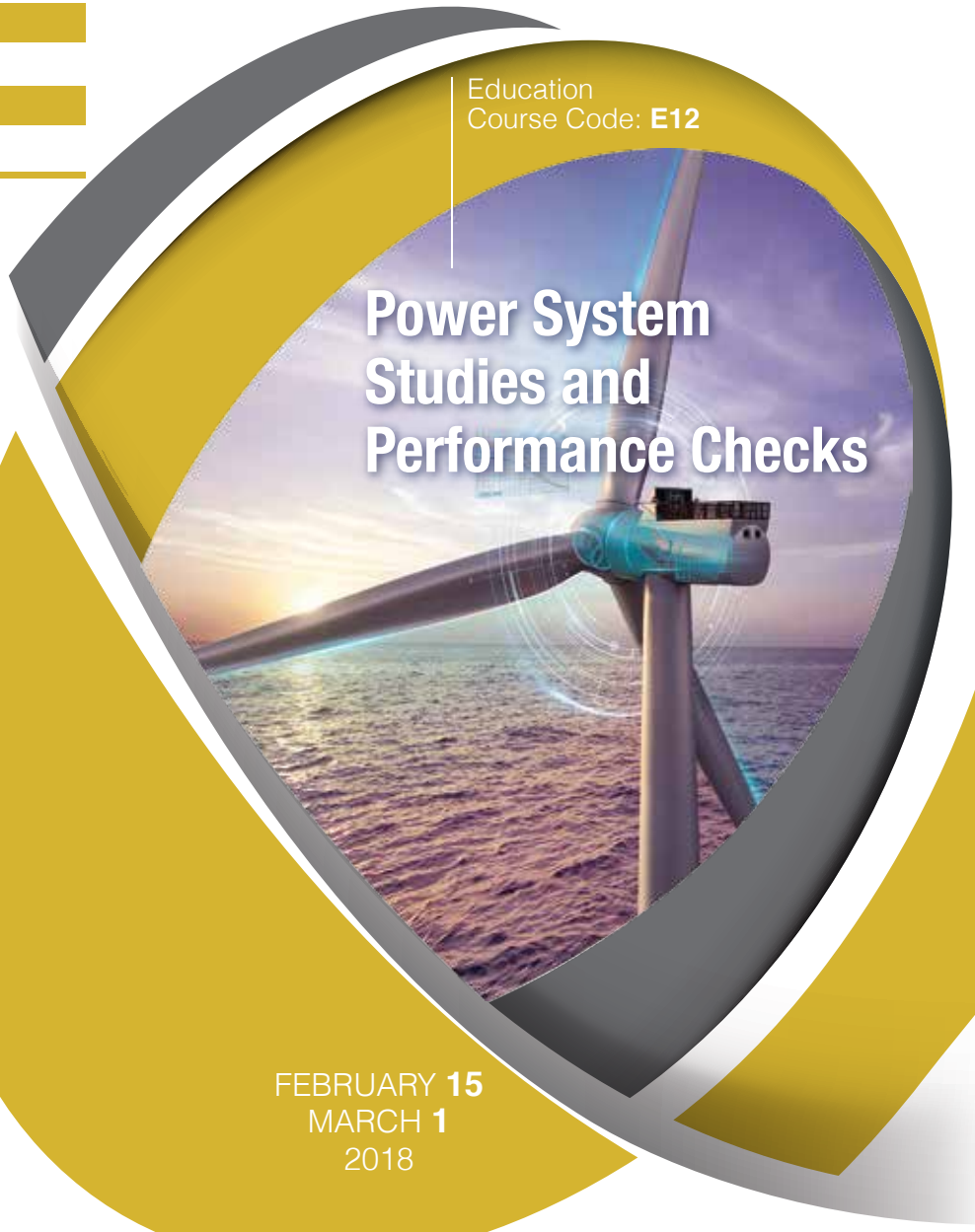
Education
Course Code: **E12**



Power System Studies and Performance Checks

FEBRUARY **15**
MARCH **1**
2018

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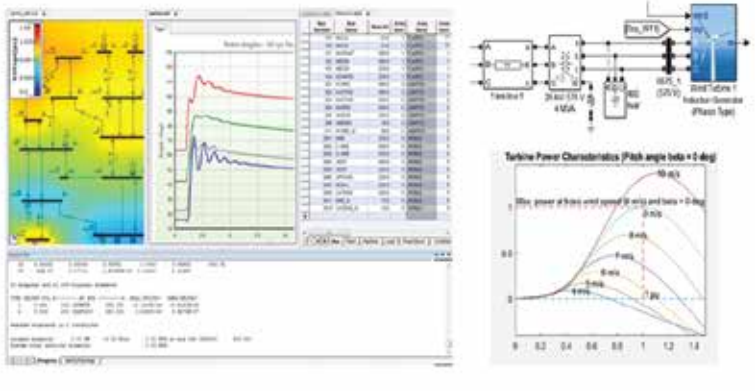
Objectives

The course provides an exhaustive description of the needs and procedure for power system performance analysis, limited to the ones represented by phasor quantities in terms of static and dynamic performance, but not in terms of instantaneous value that are typical of electromagnetic transient analysis.

The course makes use of well know commercial SW tools for power system analysis, namely PSS-E by Siemens-PTI and Power Factory by DigSilent and others. Note that just an outline of the procedure for the analysis of Temporary Overvoltages (TOV) is given within this course, since TOV's have to be simulated by means of electromagnetic transient models representing the instantaneous values of quantities (voltage and current) in the time domain, which are out of the scope of this course. Another course (namely "Electromagnetic Transients and procedure for Insulation Co-ordination") deals with TOV analysis by applying electromagnetic transient models.



PROGRAM

Power System Studies and Performance Checks

The Course program contains the following training outline:

DAY 1

DAY 1: Outline of Power Systems Studies – Load Flow

a. Outline of power system studies
- Transmission system planning activity
- Transmission system preliminary design
- Power system operational planning
- Needs for network performance checks by simulation
- Introduction to power system simulation tools with phasor models

b. Load Flow
- Load flow analysis for network development planning and preliminary design
- Load flow analysis for operational planning
- Load flow as input for other studies

DAY 2

DAY 2: Short Circuit – Reliability
- Sources of fault currents
- Fault types and fault duration
- The purpose of fault evaluation
- Short circuit current computation
- Short-circuit current computation as per International Standards
- Fault currents and circuit breakers selection and assessment
- Fault current and relaying in HV and EHV networks

DAY 3

DAY 3: Stability and Long-Term Dynamics
- General considerations on transient behaviour and stability of an electric power system
- Stability against large perturbations: first swing and transient stability
- Stability against small perturbation (Steady-state stability)
- Long-term stability

DAY 4

DAY 4: Reactive Power Planning – Outline of TOV Analysis – Voltage Quality Assessment

a. Reactive Power Planning
- Reactive power compensation devices:
- Shunt capacitor banks
- Shunt reactors
- Synchronous compensators
- Static Var Compensators (SVC)
- Optimum Reactive Power Flow (OPFR) for network development planning
- Optimum Reactive Power Flow (OPFR) for operational planning

b. Temporary Overvoltages: Outline of the methodology for TOV analysis

c. Voltage quality assessment: Harmonic disturbance, Unbalance, Flicker
- Standard and practice with respect to voltage characteristics
- Harmonic phenomena
- Unbalance
- Flicker and rapid voltage changes

DAY 5

DAY 5: Examples and In-Class Practice of Network Studies

a. Examples of power system studies made by SW tools, with critical analysis of the outcomes

b. In- class practice of power system studies by applying SW tools