Course Syllabi: UEE602 Power System Analysis and Stability (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UEE602; Power System Analysis and Stability

2. **Credits and contact hours:** Credits: 3.5; Hours: 4

3. **Text book, title, author, and year**

   - *Chakrabarti, A., Sony, M.L., Gupta, P.V. and Bhatnagar, U.S., a Text Book on Power System Engineering, DhanpatRai and Co. (P) Ltd. (2008).*
   - *Nagrath, I.J. and Kothari, D.P., Power System Engineering, Tata McGraw–Hill (2007).*
   - *Stevenson, W.D., Power System Analysis, McGraw–Hill (2007).*
   - *Gupta, B.R., Power System Analysis and Design, S.Chand and Company Limited (2009).*
   - *Pabla, A.S. , Electric Power Distribution, Tata McGraw–Hill (2008).*
   - *Wadhwa, C.L., Electrical Power Systems, New Age International (P) Limited, Publishers (2008).*

   a. Other supplemental materials
      - Nil

4. **Specific course information**
   a. Brief description of the content of the course (catalog description)
   Representation of Power System: Per unit System, Representation of power system components, Regulating Transformers (Tap changing and Phase Shifting), Generators, Transmission line ands loads, Phase shift in star-delta transformer, Sequence impedance of transmission line, Transformer and generators, Sequence networks of power system. Transmission lines and loads, Y-Bus and Z-Bus formulation.
   Load Flow Study: Load flow problem, Power flow equations, Load flow solution using Gauss Seidal and Newton Raphson methods, Decoupling between real and reactive power control, Decoupled and fast decoupled methods, Comparison of load flow methods. Reactive power compensation.
   Fault Analysis: Symmetrical fault, Algorithm for symmetrical fault analysis, Unbalanced faults (Single line to ground fault, Line to line and double line to ground, Open conductor), Bus Impedance matrix method for the analysis of unsymmetrical shunt faults.
   Power System Stability: Concepts of types of stability limits, Steady state stability analysis, Transient stability analysis, Swing equation and its solution by point-by-point method, Equal area criterion, Critical clearing angle and improvement of transient stability.

5. **Specific goals for the course**
   After the completion of the course, the students will be able to:
   - Develop an appropriate mathematical model of power system.
   - Carry out power flow analysis of practical power system for balanced three-phase system.
   - Decide generation scheduling of thermal units leading to overall economy.
   - Conduct studies during balanced and unbalanced faults to decide the fault levels and circuit breaker ratings.
   - Analyze the stability of single machine-infinite bus system and can decide the critical clearing time of circuit breakers.

6. **Brief list of topics to be covered**
    - Representation of Power System
    - Load Flow Study
    - Fault analysis
    - Power system stability