Course Syllabi: UEE804: Operation and Control of Power Systems (L : T : P :: 3 : 1 : 2)

1. **Course number and name:** UEE804: Operation and Control of Power Systems

2. **Credits and contact hours:** 4.5 and 6

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

   Text Books / Reference Books
   

   a. Other supplemental materials
      
      - Nil

4. **Specific course information**

   a. Brief description of the content of the course (catalog description)

   **Economic Operation of Power Systems:** Fuel consumption, Characteristics of thermal unit, Incremental fuel rate and their approximation, Minimum and maximum power generation limits.

   **Economic Dispatch:** Economic dispatch problem with and without transmission line losses, Unit Commitment, methods for their solutions.

   **Hydrothermal Co-ordination:** Hydro-scheduling, Plant models, Scheduling problems, Hydrothermal scheduling problems and its approach.

   **Power System Control:** Ideas of load frequency and voltage control, Reactive power control, Block diagrams of P-f and Q-V controllers, ALFC control, Static and dynamic performance characteristics of ALFC and AVR controllers, Excitation systems model, concept of area and Tie-line operations.

   **Power System Security:** Factors affecting security, Contingency analysis, Network sensitivity, correcting the generation dispatch by using sensitivity method and linear programming.

   **Small Scale Stability Analysis:** d-q model of generator, State space representation, Eigen value and participation factor analysis.

   **Voltage Stability:** Basic concepts, Voltage collapse, P-V and Q-V curves, Impact of load, Static and dynamic analysis of voltage stability, Prevention of voltage collapse.

   **Laboratory Work:** Simulation of thermal scheduling with and without losses, Unit commitment by dynamic programming, simulation of hydro-thermal scheduling by gradient...
method, Stability analysis of single area frequency control, Bias control of two area system and AVR.

5. **Specific goals for the course**
   After the completion of the course, the students will be able to:
   - Develop small scale model of alternator, excitation and governing systems.
   - Decide the scheduling of thermal units and hydro-thermal units for overall economy.
   - Design and apply control for frequency and voltage of power system represented by multi area.
   - Comprehend power system security and contingency.
   - Computation of small scale and voltage stability.

6. **Brief list of topics to be covered**
   - Economic Operation of Power Systems
   - Economic Dispatch
   - Hydrothermal Co-ordination
   - Power System Control
   - Power System Security
   - Small Scale Stability Analysis
   - Voltage Stability