**Course Objective:**  
The course aim to deliver the advance analysis of the interconnected power system including load flow, short circuit studies and stability analysis.

1. **Interconnected Power System(6 hours)**
   1. Introduction
   2. Real power/ frequency balance
   3. Reactive power/ voltage balance
   4. Node equations
   5. Bus admittance matrixes
   6. Applications of Bus admittance matrixes in Network analysis
   7. Basic concept of Bus impedance Matrixes

1. **Load Flow Analysis(8 hours)**
   1. Basic complex power flow equations for a power system networks
   2. Data for Load flow studies
   3. Iterative approaches for solving power flow equations
      1. Gauss-Seidal  method
      2. Newton- Rapshon methods
   4. Introduction to advance techniques e.g. decoupled load flow
   5. Voltage profile and var compensation

1. **Power system fault calculation(4 hours)**
   1. Definition and purpose of fault calculation
   2. Types of faults in power system
   3. Symmetrical fault calculations
   4. Calculation of short circuit MVA

1. **Unbalance System Analysis(6 hours)**
   1. Symmetrical components
   2. Sequence impedances
   3. Sequence components of the voltages and currents
   4. Expression for power in terms of symmetrical components
   5. Transformer voltages and currents

1. **Unsymmetrical faults on Power Systems(10 hours)**
   1. Sequence networks of synchronous generators
   2. Fault calculations of a single synchronous generator
      1. Line to ground faults
      2. Line to line faults
      3. Double line to ground faults
   3. Path for zero sequence currents in Transformers
   4. Fault calculations on a power system networks
      1. Line to ground faults
      2. Line to line faults
      3. Double line to ground faults

1. **Power System Stability(10 hours)**
   1. Operational power balance in a synchronous generator
   2. Classification of power system stability
   3. Swing equation & swing curve for a single machine infinite bus system
   4. Rotor angle stability; steady state, dynamic & transient stability
   5. Equal area criterion
   6. Stability enhancement techniques
   7. Step by step method for solving swing equations by computer methods
   8. Basic concept of voltage stability

**References:**

1. Power System Analysis by W.D. Stevension, Tata McGraw Hill Publications
2. Power System Stability and Control by P. Kundur
3. Modern Power System Analysis by I.J Nagrath and D.P Kothari, Tata McGraw Hill Publications

**Evaluation Scheme:**  
The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

|  |  |  |
| --- | --- | --- |
| **Chapter** | **Hour** | **Marks Distribution \*** |
| 1 | 6 | 10 |
| 2 | 8 | 16 |
| 3 | 4 | 8 |
| 4 | 6 | 10 |
| 5 | 10 | 16 |
| 6 | 10 | 20 |
| Total | 42 | 80 |

**\*Note: There may be a minor deviation in Marks distribution**