Course Code EPE 802	Credit Hours (Th-Pr) 3-0	**Advanced Power System Stability and Transient Studies (core)**	Contact Hrs/Week (Th-Pr) 3-0	Total Contact Hrs (Th-Pr) 45-0

Course Outline:

1. Topics include introduction to the power system stability problem, rotor angle stability, voltage stability, voltage collapse, small signal stability, midterm and long term stability, sub synchronous oscillations, synchronous machine modelling and representation in stability studies, Power System Loads, Excitation Systems, Prime Movers and Energy supply systems, switching surges, mechanisms of transient generation, insulation coordination, grounding, surge protection devices, and shielding.

Eligibility Criteria

2. B.E (Electrical Engineering)

Recommended Books:

S. No.	Title	Author(s)	Assigned Code	Remarks
a.	Power System Control and Stability	Anderson and Fouad	AF	Text Book
b.	Power System Control and Stability	Prabha Kundur	PK	Text Book
c.	Electrical Transients in Power Systems	Allan Greenwood	AG	Reference
d.	Power System Dynamics : Stability and Control	Jan Machowski	JM	Reference
e.	Power System Stability : Modelling , Analysis and Control	Abelhay A. Sallam	AA	Reference

Course Objectives:

Understanding of the modelling of synchronous machines, maintaining and handling the inertial problem in power system, pre and post disturbance state of the power system and transients caused by switching and lightning strikes

Learning outcome:

On successful completion of the module the student will be able to:

- Recognize and demonstrate a comprehensive understanding of the different types of disturbances in a power system
- Perform comprehensive transient's studies caused by different contingencies
- Perform modelling and analyses of synchronous machines
- Conduct estimation studies in a power system

Topics Covered:

No.	Topics	Text Book	Contact Hours
1.	**Power System Stability Overview** • Understanding power system stability • Classification of power system stability • Small signal stability • Transient stability • Stability margin increase • Need for modelling	PK & AA	08
2.	**Modelling of synchronous machine** • Synchronous machine equations • Parks Transformation • Machine Parameters in per units • Synchronous machine equivalent circuits • Flux Linkage space state model	PK & AA	08
3.	**Synchronous machine connected to a power system** • Synchronous machine connected to an infinite bus • Synchronous machine connected to integrated power system • Synchronous machine parameter under different operating modes • Excitation System Modelling • Modelling of prime mover control system • Modelling of transformers, transmission lines and loads	PK & AA	08

4.	**Power flow analysis and Optimal power flow** • General Concepts • Newton Raphson Method • Gauss Siedal Method • Decoupling Method • OPF with dynamic security constraint	PK & AA	08
5.	**Stability Analysis** • Equilibrium Points and their stability • Phasor diagram of synchronous machine • Small signal stability of multi machine system	PK & AA	05
6	**Transient Analysis** • Numerical integration techniques for transient analysis • Transient analysis of a simple power system • Transient analysis of a multi machine power system • Different transient energy function function methods • Interchange Evaluation with Unit Commitment • Multiple-Utility Interchange Transactions • Other Types of Interchange **Different stability enhancement and control methods**	A,P & S	08