M.TECH SECOND SEMESTER
POWER SYSTEM STABILITY AND CONTROL

17EEPC2T1 **Credits: 4**
Lecture: 4 periods/week **Internal Assessment: 40 marks**
End Semester Assessment: 60 marks

Course Objective:
To study the modeling of synchronous machine and stability analysis in power system.
Course Learning Outcomes: At the end of the course the student will be able to

1. Understand the concept of dynamic modeling of a synchronous machine.
2. Understand the concepts of the small signal stability.
3. Understand the concepts of the transient stability.
4. Understand the concepts of voltage stability.

UNIT –I: POWER SYSTEM STABILITY
Structure of power System and its controls, Concept of Power system stability, Types of stability.
Synchronous machine theory and modelling: armature and field structure, parks transformation, machine with multiple pole pairs-mathematical description, d-q transformation, per unit representation, equivalent circuit for d-q axes, steady state analysis-voltage-current and flux linkage, phasor representation, rotor angle – steady state equivalent circuit.

UNIT-II: SMALL SIGNAL STABILITY
Fundamental concepts of stability of dynamic system, Eigen properties of the state vectors, analysis of stability small signal stability of a single machine connected to infinite bus system, classical representation of generator, small signal stability of a multi machine connected to infinite bus system. Characteristics of small - signal stability problems.

UNIT-III: TRANSIENT STABILITY
Concept of transient stability, response to a step change in mechanical power input, Swing equation- factors influencing transient stability, numerical integration methods – Euler method – R-K method (4rth order), critical clearing time and angle- methods for improving transient stability.

UNIT-IV: VOLTAGE STABILITY
Basic concept, transmission system characteristics, generator characteristics, load characteristics, PV curve, QV curve and PQ curve, characteristics of reactive power compensating devices. Voltage collapse and prevention of voltage collapse.

TEXBOOKS:

1. Power System Stability and Control – Prabha Kundur – TATA McGraw Hill publications.
2. Power System Dynamics Stability and Control – K.R.Padiyar, II Edition, B.S.Publications.

REFERENCEBOOKS:

1. Power system control and stability - P.M. Anderson and A.A. Fouad, Wiley-IEEE Press
2. Power System Stability, Vol. I, II & III- E.W. Kimbark - Wiley-IEEE Press