INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

POWER SYSTEM STABILITY								
VI Semester: EEE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEEC36	**Elective**	3	-	-	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: DC Machines and Transformers, Power System Analysis								

I. COURSE OVERVIEW:
This course gives an insight into the various problems encountered in power systems related to reliability, stability and quality power. The course involves assessment of stability of a power system, improvement in stability and prevention of the system becoming unstable. The course would enable the students to figure out power system problems. This course deals with the development of detailed models of power system components and their application in the analysis of the dynamic behavior of interconnected power systems in response to small and large disturbances.

II. COURSE OBJECTIVES:
The students will try to learn:

I. The state of estimation into different types.
II. How to monitor security and contingency evaluation.
III. The need of automation in power systems.
IV. The importance of voltage stability and voltage stability indices.
V. The artificial intelligence and artificial neural networks to power system analysis.

III. COURSE SYLLABUS:
MODULE-I: INTRODUCTION TO POWER SYSTEM STABILITY PROBLEMS (08)
Definition of stability, classification of stability, rotor angle stability, frequency stability, voltage stability, midterm and long-term stability, classical representation of synchronous machine in a single machine infinite bus system (SMIB), equal area criterion to asses stability of a single machine infinite bus system, limitations of classical model of synchronous machines.

MODULE -II: MODELING OF POWER SYSTEM COMPONENTS FOR STABILITY ANALYSIS (10)
Synchronous machine modeling: Sub transient model, two axis model, one axis (flux decay) model, classical model; Excitation systems modeling: DC excitation, AC excitation and static excitation, prime mover and energy supply systems modeling, transmission line modeling, load modeling, methods of representing synchronous machines in stability analysis.

MODULE -III: SMALL SIGNAL STABILITY (09)
Fundamental concepts, state space representation, modal analysis: Eigen properties, participation factors, stability assessment, effects of excitation system on stability.

Power system stabilizer and its design, angle and voltage stability of multi machine power systems and phenomenon of sub synchronous resonance.

MODULE -IV: TRANSIENT STABILITY (08)
Fundamentals of transient stability, numerical solution of algebraic differential equations, simultaneous implicit and partitioned explicit methods, analysis of unbalanced faults, direct method of transient stability, methods of improving transient stability.

MODULE -V: VOLTAGE STABILITY (08)
Classification of voltage stability, voltage stability analysis, modeling requirements, static and dynamic, prevention of voltage collapse.

IV. TEXT BOOKS:

1. P Kundur, "Power system Stability and Control", Tata McGraw Hill, 1st Edition, 2001.
2. M A Pai and Peter W Sauer, "Power System Stability", Pearson Education, 1st Edition, 2000.

V. REFERENCE BOOKS:

1. M A Pai, K Sengupta and K R Padiyar, "Topics on Small Signal Stability Analysis", Tata McGraw- Hill, 1st Edition, 2005.
2. K R Padiyar, "Power system dynamics", BSP Publications, 2nd Edition, 2010.
3. Paul M Anderson and A Fouad, "Power System Stability", Wiley-inter science, 1st Edition, 2002.

VI. WEB REFERENCES:

1.https://www.researchgate.net
2.https://www.aar.faculty.asu.edu/classes
3.https://www.facstaff.bucknell.edu/
4.https://www.electrical4u.com
5.https://www.iare.ac.in

VII. E-TEXT BOOKS:

1. https://www.jntubook.com/
2. https://www.freeengineeringbooks.com